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ABSTRACT

This document contains the proceedings of the Annual Conference of the North American Association for Environmental Education (NAEE). The conference featured 10 keynote addresses and invited speakers, multiple workshops, panels, and symposia, and over 120 contributed presentations. The document contains 10 chapters, the first of which contains the speeches delivered by the keynote speakers as well as general session addresses. Chapter 2 is composed of a summary report of the preconference workshop. The remaining chapters contain extended abstracts of the conference presentations, including symposia and panels. The abstracts have been arranged into the following topic areas: (1) environmental education (EE) curriculum and instruction; (2) teacher education; (3) higher education and non-teaching professions; (4) environmental studies; (5) EE in the nonformal realm; (6) citizen action; (7) EE and communications; and (8) international EE. In instances where an extended abstract was not submitted, the short abstract from the conference program was included in order to provide a complete record of the conference. (TW)

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Environmental Education: Transition to an Information Age

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Conference

Eugene, Oregon

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ENVIRONMENTAL EDUCATION: TRANSITION TO AN INFORMATION AGE

1986 Conference Proceedings

Selected Papers from the Fifteenth Annual
Conference of the North American
Association for Environmental Education

Edited by
Jody M. Stone
University of Northern Iowa

Published by

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For Environmental Education**
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August 1987

Preface

This document contains the proceedings of the Fifteenth Annual Conference of the North American Association for Environmental Education (NAEE). The Conference was held on the campus of the University of Oregon at Eugene from September 11 through 16, 1986. The conference featured 10 keynote addresses and invited speakers , multiple workshops, panels ,and symposia, and over 120 contributed presentations.

A number of cosponsoring organizations participated formally in this year's conference. These include the Northwest Association for Environmental Studies (NWAES), the Solar Energy Association of Oregon (SEA of O) and the Global Tomorrow Coalition/west (GTC/W), the Environmental Education Association of Oregon (EEAO), the Western Regional Environmental Education Council (WREEC), and the International Society for Environmental Education (ISEE).

This year, the Elementary and Secondary, Non Formal and Environmental Studies Sections of NAEE joined forces in a special preconference workshop. The experiences and expertise of the workshop participants formed the basis for discussion and consesus building regarding the progress of environmental education over the past decade. The broad goals of EE, set forth at the Tbilisi Conference in 1977, were used to evaluate the progress of EE. The workshop considered advances that have been made in EE as well as areas of weakness. In addition, identification of key ingredients of successful, forward-thinking EE programs was sought by workshop participants. Future directions in EE were considered, including possible program changes in response to societey's transition to an informatin and service base.

The purpose of this document is to provide as complete a record as possible of the activities of the annual conference. The Proceedings is composed of ten chapters, the first of which contains those speeches delivered by keynote speakers as well as general session addresses. Chapter 2 is comprised of a summary report of the preconference workshop. The remaining chapters contain extended abstracts of the conference presentations, including symposia and panels. The abstracts have been arranged into these topic areas: (1) EE Curriculum and Instruction, (2) Teacher Education, (3) Higher Education and the Non-teaching Professions, (4) Environmental Studies, (5) EE in the Non Formal Realm, (6) Citizen Action, (7) EE and Communications and (8) International EE. In instances where an extended abstract was not submitted, the short abstract from the conference program was included in order to provide a complete record of the conference.

Jody M. Stone
Editor

Forward

The 1986 NAEE Conference in Eugene, Oregon and its theme "Environmental Education: Transition to an Information Age" represented an important beginning for EE in North America. In recent years NAEE conferences have explored the implications of information technologies for pedagogy and the learning process, but consideration of the significance of the emerging information age for EE content has received scant attention. A scattering of papers and the Conference keynote address raised some of the social, political, economic, and ecological issues which will become increasingly important as the technological base of a modern society changes. To remain current, content, as well as to emphasize teaching and learning methods which are effective.

The new electronic technologies are not only much more powerful, effective, and inexpensive than their "smokestack" industrial era counterparts with all of the economic implications these characteristics suggest, but they also appear to have a much more benign impact on the environment than the mechanical technologies of the industrial era. For example, a technology whose primary resource is sand has a significate resource advantage over a technology which relies upon less abundant mineral resources. Likewise, electronic technologies use less energy to generate more power and produce significantly less waste than earlier industrial technologies. Such a technological transition may have positively exciting implications for an environmentally stressed plant Earth!

We environmental educators continue to be ambivalent about the environmental effects of technology and the full impact of information age technologies is not yet clear. Certainly, it would be premature to hail these technologies as the new environmental panacea, just as it was short-sighted in the 1960's and 1970's to blame technology for all environmental ills. If we view technology as a tool which can be used for good or ill, the onus for the impacts of technology falls where it must -- upon the wisdom of humankind. As environmental educators it is incumbent upon us to be life-long students of the interrelationships among science, technology, society, and the environment, especially during an era in which what we teach can become outdated very quickly, althouhg how we teach may continue to be highly effective.

The 1986 Conference also was an NAEE experiment in holding the Conference as a joint program in cooperation with other environmental organizations, specifically the Northwest Association for Environmental Studies, the Solar Energy Society of Oregon, and the Global Tomorrow Coalition-West, as well as cosponsoring relationships with the Environmental Education Association of Oregon and the Western Regional Environmental Education Counsel. Although the joint program did not attract as many participants as was hoped, nor realize the full extent of anticipated cross-organization interaction, it did make possible such speakers as Amory Lovins, Don Lesh, Joan Martin-Brown, John Maxwell Hamilton, and Ralph Cavanagh, as well as such events as NWAES's Northwest Symposium on the citizen's role in environmental education.

Jody Hines Stone is to be congratulated on her outstanding and tireless efforts in skillfully editing this volume and assuring its early appearance. I would also like to thank a number of people for their key 1986 Conference contributions -- John Baldwin, Joan Heidelberg, John Disinger, Alan Schwartz, Lori Mann, Paul Hart, Diane Lowrie, Phil Barrett, Nancy Miller, Adelia Peters, Justine Magsig, Rosanne Fortner, and Donna Rogler. Many others also provided valuable support, especially the staffs of the Brukner Nature Center and the University of Oregon.

Jerry Berberet
NAEE President
Salem, Oregon
August 1987

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THE CHALLENGE FOR ENVIRONMENTAL EDUCATION IN AN INFORMATION AGE

Jerry Berberet, President
North American Association
for Environmental Education
Academic Dean
Williamette University

Our world has entered a period of accelerated cultural change in response to the impacts of electronic information technologies. Such change not only affects the ways we work and play, but the ways we relate to one another, the ways we construct our views of reality, and the structures of the institutions by which we manage our society.

Almost all of us in the industrialized world have, often unwittingly, experienced these changes, although the public tends most to associate society's transition to an information age with the technology itself -- with computers, robots, satellite dishes, and monitoring gadgetry in new cars. Most of us accept, often with enthusiasm, that we must use computers in our work and personal lives; likewise, we recognize that international diplomacy was changed forever via telecommunications during the 1980 hostage crisis in Iran. We realize that a great deal of this technology is a byproduct of the space program. Many of us are at least vaguely anxious that computers and robots may cause widespread technological unemployment. Some of us even worry that our children may prefer interaction with their home computers to human relationships. Yet, how much have we thought about the effects of the information age upon relationships between people and the environment?

In the environmental field new information technologies are perhaps most conspicuous in the areas of environmental monitoring and assessment. Space satellites, for example, have made possible remarkably sensitive monitoring of global events and precise mapping of natural and built environments. Electronic assessment techniques have produced convincing evidence of source points of acid precipitation, extended our knowledge of the Antarctic in dramatic ways, and made possible the spectacular discovery and filming of the Titanic. In August 1986, Newsweek magazine reported the role of electronic technologies in the finding that as many as 8 million homes may be threatened by radon gas radioactivity, a potent cause of lung cancer.

Unquestionably, our ability to pinpoint responsiblity for environmental degradation and, correspondingly, a potential to develop more effective management and regulatory procedures on a biospheric scale is being enhanced enormously. Prospects for a brighter environmental assessment and mangement. In spite of this increased capacity to know, however, the environmental impacts of human activity within the analytical context of a post-industrial era have received little attention to date. Environmental impacts of post-industrial human activities are the primary focus of this paper, with an emphasis on implications of the information age for the world view and subject content of environmental educators.

I agree with John Disinger's contention (1986) that environmental education (EE) today largely reflects the focus and concerns of its predecessors of the 1960s and before, a preoccupation with nature study, conservation education and outdoor education. While commending the continuing educational value of these three forms of environmental education, Disinger expressed concern that environmental educators inadequately treat relationships between the environment and human society, including recent advances in scientific knowledge of environmental problems and their complexity and the development of alternatives for problem resolution. If this lack of attention to the human ecosystem and institutions for environmental management has been a shortcoming of environmental education in an industrial era, the effects of such inattention may be more serious as global society enters the information age.

Paul Hawken (1983,106) addresses this notion of society's transition: "The informative economy will not replace the mass [industrial] economy; it will absorb and include the mass economy in the course of its evolution. We will need steel, rubber, airplanes, pulp mills, and trucks for centuries." The great industrial era in the developed world was built on cheap and plentiful fossil fuel energy, primarily oil. This era came to an end in 1973 with the Arab oil embargo and the ten-fold increase in the price of oil which soon followed. The developed world had little choice but to accelerate technological innovations in an effort to use less energy per unit of production. This occurred primarily in the form of rapid developments in computers, robotics, and biotechnology and the application of energy conservation measures. The economic shift took place so quickly that by the late 1970s energy demand curves began to flatten. This, in turn, produced a leveling, then a fall in world oil prices. Soon oil producing countries, almost all from the developing world, experienced debt crises as declining oil revenues failed to provide sufficient capital to service large loans extended primarily by Western banks during boom times to finance development.

Presently, a somewhat oversimplified global reality includes a developed world at various stages in the evolution of information and service economies and a developing world with high economic aspirations that is forced to place increasing economic pressures on the environment to generate revenues for debt payments. Development pressures, exacerbated by rapid population growth, not only threaten to overwhelm the natural environment through deforestation, desertification, soil salinization, and waste generation, but to undermine the cultural stability necessary to create and maintain the social and political infrastructure which is basic to a society's successful development.

Hawken is convinced that the information era is here to stay. Our choice, he contends, is either to "consume more energy and drive its price higher, making goods more expensive and causing inflation and declining wages; or [to make] the economy more informative by developing methods of production and patterns of consumption that use less energy and capital resources and more knowledge... The industrial age mechanized manual labor; now semiconductors and microprocessors are bringing technology to the mind." Information technologies build sophisticated analysis, communication and decisionmaking capabilities into the technology itself (3).

Fascinating! Technology and the marketplace conspire to develop a more conserving society which at once uses less energy and fewer resources and, due to its increasing efficiency, generates less waste because the speed and minaturization of electronic technologies make possible a harnessing of power and productivity unheard of in the industrial era. In one sense the implications are simultaneously mind boggling and optimistic; in other ways the possiblities seem contradictory and depressing. Either way important indications about the future are presented that deserve the attention of environmental educators.

On the optimistic side a technological revolution which implies lower energy and resource consumption, while reducing the volume of waste by products, has to be welcome news for an environmentally-stressed planet Earth. Likewise, the analytical, communicative, and productive capabilities of the new technologies would seem to have substantial potential for educational, social, economic, political and cultural development. Never has the technological tool chest contained more tools to benefit humankind. Although it is true that production of computer chips releases some toxic wastes to the environment and has some negative effects on worker health, such problems seem to be manageable. Much more toxic are the mountains of petrochemical wastes generated by the plastic throwaway society that originated in the industrial era.

On the pessimistic side, the information age, at least in the short term, has some foreboding implications, especially for the developing world. With the exception of the somewhat uncertain ability and will of the more developed world to clean up toxic wastes and manage nuclear energy safely, arguably the most alarming environmental crises of our time are occurring in the developing world, e.g., worldwide disappearance of tropical forests, famine in Africa, widespread destruction of soils -- crises being exacerbated by population growth and increasing debt pressures.

In the global economy of the information age, developing world economies may be seriously disadvantaged in competing with the electronic technologies of the developed world, electronic technologies that are more efficient in the production process. One might argue that the developing world has a competitive advantage in its large cheap labor force. But, unless this often uneducated labor force can quickly learn information age skills, it may not be a decisive factor due to the rapidity of technological change. The same kinds of competitive forces that currently most benefit Japan and the United States are also straining the adaptive capabilities of Eastern and Western Europe (Nussbaum 1983). At least in the short term the information age seems to be exacerbating development pressures upon the environments of the developing world.

Yet, several factors could mitigate this bleak outlook for the future of the developing world. First, although E.F. Schumacher wrote from a late industrial era perspective, his advocacy of appropriate technology still seems relevant today. Gaining technological efficiency in ways that maximize inputs of human labor and scarce development capital while minimizing adverse environmental impacts is an information age necessity. Second, to compete successfully in global markets third world development must minimize the energy and resource inefficiencies and environmental excesses of industrial era practices, while maintaining sufficient cultural stability to avoid political and social disintegration. The latter is a sorry tale of woe that has plagued the developing world since former European colonies became independent states after World War II.

Environmental educators have paid little attention to the importance of continuity when a traditional culture modernizes, but the values, mores and institutions of a traditional society can represent valuable sources of stability in the wake of modernization pressures. If the pace of economic development is too rapid and focused exclusively on the goal of improving material standards of living at the expense of nonmaterial dimensions of quality of life, a void may be created jeopardizing the social cohesion provided by the traditional culture. Economic development may seem a hollow achievement, indeed, if such a void is filled by social disorder, authoritarian politics and cultural anomie.

Develpoment is a complex cultural phenomenon. Many of the values, customs and institutions of traditional culture are necessary building blocks for the infrastructure required to support and manage an evolving society. In making the transition from traditional to modern status, most nations probably cannot simply leapfrog the industrial era and enter the information age. And, given the variances among the national cultures, for developing nations to follow mindlessly the development paths of industrial societies, especially those of highly developed nations whose cultural traditions may be quite different from their own, would seem to be folly. The environmental educator who focuses singlemindedly on physical and biological conditions and ignoroes sociocultural differences, the workings of a global economy, and the rudiments of current interaction among energy, resources, waste, technology and environment may contribute to such folly.

Technological innovations of the information age are probably imperative in the economic development and environmental amelioration of the developing world. Whether the introduction of new, disease-resistant plants, the reforestation of eroded slopes, the restoration of salinized soils, the development of culturally-compatible birth control methods, the mass communication of culturally-compatible development education, or the harnessing of information age technological efficiencies -- it would seem that a wise scenario for the future acknowledges information age realities and makes application on a scale appropriate to unique cultural and environmental conditions.

What are the implications of all this for the environmental educator? First, there must be an emphasis on content as well as pedagogy in environmental education. An environmental educator who does not also engage in ongoing inquiry and analysis about global cultural and environmental interactions may be a loose cannon on the deck whose actions impede society's understanding of human-environment relationships and what must be done to insure a sustainable future.

Regarding content, the world view in environmental education was shaped by the highly politicized environmental movement of the 1960's and currently seems locked in a time warp. It is unfair oversimplificiation to say that environmental educators only stress negative, anti-economic stances that portray the pastoral serenity of Constable painting or the pristine wilderness of Muir's Yosemite as humankind's ideal relationship with nature. But, we environmental educators have a long way to go before we will be taken as seriously as we should in the very serious debate about how to determine societies environmental future during the information age.

Having delivered what I earnestly intended as loving criticism among colleagues, I hasten to stress that EE's stress on awareness of nature is critical to the positive value formation which undergirds environmental stewardship at a time when electronic technologies often oversimplify and depersonalize contact with nature. As well, the EE program emphasis upon nature and development of simple ecological concepts is primarily directed toward children. The most serious shortcomings of EE may well lay at the secondary and college levels where habits of integrative thinking have been inadequately infused into the humanities, science and social science disciplines. EE must acquire facts as well as philosophy, a weighing of well-crafted alternatives as well as simplistic conclusions and calls to action.

A few ruminations to conclude these remarks:

1. "Think Globally -- Act Locally" is more than a superficial slogan and its implications run deeper than a simple ecological view of the biosphere and membership in the local environmental movement. Environmental educators must develop a more international and intercultural world view, while recognizing the uniqueness of localities as laboratories for study and stewardship

2. EE must relate more effectively to people of diverse cultures -- inside as well as outside North America -- and relate issues to hunger, social justice, and civil rights as well as to environmental quality. We environmental educators must reach a wider ethnic and economic audience if our message is to be effective. A legitimate fear about the information age is that it will increase the wealth and knowledge gap between rich and poor. Individuals and school districts that can afford computers and other electronic technologies will have them and those that can't won't, to the detriment of the latter in an age of rapid technological and social change.

3. A fundamental re-examination of preservice and inservice teacher education programs is going on in North America. The Holmes Group study calls for fundamental changes in the preparation of teachers, but we in environmental education have been silent on this important topic to date. Implementations of what is worthy in this paper depends upon the best possible preparation of all teachers to deal with the content of environmental education. If we let the current opportunity slip by without action, our next chance to influence teacher education may not come along for another decade or more.

4. Using effective educational processes and technologies is always challenging, but let's harness the new technologies for EE. Many of the greatest information age advances have come in our capacity to understand more fully human-environment relationships.

Finally, the current pace of change is so rapid and the nature of environemtnal problems so serious that we simply must devote our attention to the future. What must we do as environmental educators to assure a sustainable future? Can we describe environemtnal problems comprehensively, incorporating cultural analyses as part of our profile of the global system? In what ways might differing ethical perspectives be treated as central to the EE message? Could we infuse concepts like "interdependence" and "adaptability" with greater intellectual substance to support their simple ideological appeal? How do we communicate effectively across political, economic, social, cultural, and geographical lines?

The challenge for the future encompasses the entire biosphere. Few causes would seem to have more long term importance. There is a special kind of commitment to human betterment and a better world that inspires environmental educators and this is one of our best hopes for the future.

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STRATEGIES FOR EFFECTIVE INFORMATION DISSEMINATION IN A HIGH TECH AGE

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This is not the easiest time to be getting information to people. Not because excellent delivery systems aren't available, but because there are so many of them.

Ours is the age of the media. Breath-taking advances in information generation, storage, and delivery present potential consumers of information with a mind-bogging range of choices. Radios and televisions, for example, which once received only a handful of stations now offer dozens, if not hundreds of options. Alvin Toffler calls this "over-choice" (Roffler, p.263).

There is virtually not limit to the number of sources competing to attract our attention, allegiances, and financial contributions. Print and electronic media, satellites, computers, cable networks and many others bombard potential consumers daily with a plethoria of messages and information (see Taylor, p. 2, for a more exhaustive listing). According to Toffler, the result for many of us is both " information overload" and "future shock" (Toffler, p. 350).

As environmental educators and publicists it is crucial that we remember that people are innudated with information today. Librarians, fellow educators, the general public, and the mass media all have more information to deal with than they can handle. In most cases, "selective attention" (Ragland and Saxan, p.38) acts as an unconscious mechanism to help people cope with the overload . It is a phenomenon of no small consequence for environment educators because our mesages are often not what some peole want to hear.

By recognizing the operation of selective perception and the intense competition for the attention of target audiences, environmental educators put themselves in a position to adapt to the realities of a world in which dissemination of conservation-minded information is by no mean any easy task (see Edmundson).

Given these circumstances, wouldn't it be great if every one responsible for disseminating environmental information had marketing, advertising, and media experiences as functional components in their professional repetoire? However, as you know, this tends to be the exception rather than the rule. As a result, for many of us, enthusiasm and basic communication skills must compensate for the lack of formal training into those areas. And all too often, time, money, and effort are wasted while we learn the "tricks of the trade" (see Boulton for an excellent discussion of issues involved).

Like many of you, I am a product of the "street learning" school of public relations. Since my start as the sports editor for may local paper at the age of 15, I have spent a significant part of the last 26 years writing and disseminating information for musical groups, international education and E-Week projects, the International Crane Foundation, and most recently the International Affairs Office of the U.S. Fish & Wildlife experiences to share insights which may streamline the learning process for newcomers in the field--and provide useful tips and points of reference for veterans.

Message Content

Identification and development of the content of a message is the important first step in communication--and information dissemination. In many cases, I feel it is one which too few people take seriously enough. As a result, some publicisits prematurely disseminate flawed messages.

For example, during my early days as the Public Affairs Officer for the International Crane Foundation (ICF), I lavished untold hours at the end of 1979 tracking down details for stories on the erroneous assumption that radio, television and print editors would uniformly want the same thing: all the information about each crane story they could get. As a result, I made the mistake of sending off the same lengthy 3-4 page press release to everyone.

Although my stories usually got into the media, they almost always appeared in greatly condensed and heavily edited form. Radio and television stories usually ran 20-40 seconds in length; newspaper articles rarely exceeded 300 words. Predictably, key aspects of stories were sometimes overlooked as editors of daily media skipped through an overabundance of details while under the press of tight deadlines. On the other hand, less harried editors of monthly conservation magazines or scientific publications would use most of my releases and usually get all germaine points.

As time passed, the limitations of the shotgun approach to publicity (which had worked well in other situations) became increasingly clear to me. And eventually I developed a list of questions to help me better identify, prioritize, and differentiate the content of messages for various media and different audiences. Those questions included:

- Exactly what information or ideas needs to be conveyed to others?
- Is this material inherently simple or complex? How much

detail is needed to support the basic message? Is the requisite detail likely to overwhelm my primary target audiences? Is the story or information simply too complicated for most people?

- What amibiguities in this message are likely to confuse people completely unfamiliar with its content? What unintended messages may audiences recieve from the material? How can amiguities be reduced or eliminated?

- Will editors look at this information as news or esoteric trivia?

- Can the main idea and essential information be summarized in one or two sentences by news editors? If not, why not? Will the main ideas lose their integrity if reduced to three sentences of radio or television broadcast - or three inches of news print?

- What are the chances that the editing process will modify the information ways which confuse or misinform target audiences?

- Are the potential benefits of publicizing this material worth the attendant risks?

Personal differences in sensory apparatus, personal experience, moods and vested interests always work against messages being interpreted as intended. Using the questions above as a frame of reference improves the tightness of stories, reduces queries from editors, and decreases the likelihood of inaccuracies when the material is published.

Identifying Organizational and Personal Motivations

In my opinion, blindness to hidden or unconscious professional, institutional, and personal agendas is the most common reason why people sometimes shoot themselves in the foot with their own publicity. Although many environmentalists view ourselves as informed, objective, well-meaning individuals, others don't always see us in the same light.

Indeed, we must occasionally deal with the sterotype which casts "environmentalists" as fuzzy-minded idealists with narrow vested interests and little appreciation for the politics and economics of "the real world".. Regardless of its appropriateness, the sterotype is sufficiently pervasive to warrant conscious steps by environmental publicists to minimize the risk that their efforts will be viewed as parochial axe grinding or charades for self-aggrandizement.

Editors of newspapers and electronic media are particularly sensitive to the distinction between news and advertising -- and when they are employees for commercial enterprises, they should be. In developing a long-term relationship with a newspaper editor, for example, one should recognize that he or she knows most of the tricks used to get free advertising. Thus, if the real purpose of a release is to get free advertising, my recommendation is that the cards be laid on the table. In the long run you'll get a lot more respect -- and stories -- from that person than if things are misrepresented.

Another relevant point here is that when information leans away from presenting a balanced picture and takes on aspects of sales and advertising, it assumes characteristics of what some Europeans and Asians call "propoganda". Eschewing the perjorative connotations Americans typically associate with the word, many people elsewhere in the world see "propoganda" as information which bodies unbalanced evidence of self-interest, bias, and ego (see Taylor, 1984, regarding "information")

Certainly there are times when environmental publicists are -- and should be partisan advocates for ideas, organizations, and personalities. However, spades are spades -- and most people know them on sight. Hence, my recommendation is that playing games with oneself or others can be avoided by asking questions like these before distributing information to others:

- Why do I want to disseminate this information? To share legitimate news? To sell something? To keep something or someone in the public eye? To remind people of something? To promote an individual? For personal gain? All or some of the above?

- What hidden agendas could be at work here? How have they influenced my creation of the message at hand?

Asking -- and answering -- these questions honestly isn't always easy. But, in my own case, keeping them nearby has repeatedly served to keep me from losing track of what is really motivating me -- personally or organizationally.

Potential Target Audiences

After a message has been carefully crafted, the environmental publicist's next task is to deliver it to the right audiences. Successful implementation of good conservation ideas is usually contingent on gaining support from a wide variety of sources -- friend and foe alike. There are times to tailor specific messages only for the converted, but information frequently must be designed and transmitted to neutral and adversarial audiences. Thus, insightful assessment of potential target audiences is essential to effective information dissemination.

A headline in an Indian newspaper -- "Environmental laws no substitute for awareness" (Hindustan Times, page unknown) -- had special meaning for me recently. Why? Because new crane hunting laws instituted in Pakistan's North West Frontier Province (NWFP) in 1984 have had less than the desired impact because key audiences were inadvertently ignored or simply underemphasized in publicity and educational activities associated with implementation of those laws (Landfried, 1986, p.164).

From the start my colleagues and I sought to avoid only talking to the converted and purposely directed differentiated messages -- educational and otherwise -- at a wide spectrum of groups and individuals. Among the target audiences were hunters, high level federal and provincial officials, forest and wildlife department field staff and students, students at Pakistan Forest Institute, and representatives of the media (for more detail on these implementational strategies see Landfried, 1987, pp. 3-5). Unfortunately, however, little or none of the rationale behind new crane hunting restrictions had filtered down to two important groups -- the hunters and magistrates -- by the time the laws were pushed through the provincial assembly in March, 1984, by the decisive martial law governor of the NWFP.

Responsible for adjudicating alleged violations of the laws, local magistrates and judges have been a primary source of frustration to wildlife staff as a result of a propensity to leave violators of crane hunting restrictions off the hook. In retrospect, however, their behavior is understandable given the lack of a history of conservation in the area, and the likelihood that judges or their relatives are hunters themselves.

What did we learn from these oversights? Perhaps the first lesson is that special efforts should be made to educate and seek support from the people most directly affected by legislation (see Thalman, pp. 5-7 for ways to work directly with target audiences). With the crane laws our approach was flawed because we essentially sought to impose our agenda on the hunters without taking the time to enlist their cooperation for a program which was really designed to protect, rather than eliminate, their sport. Had the hunters understood the logic and importance of th legislative initiative, they may have seen conservationists as allies rather than unreasonable foes.

In retrospect, the primary targets in Pakistan should probably have been the hunters, wildlife enforcement staff, and judges; and secondary targets should have been those targeted first (i.e., high level officials, forestly school personnel, the media, and conservationists). In any case, the range of support needed to succesfully implement conservation projects is generally broader than people think and it is crucial that environmental educators not unduly omit their options. Thus, target audiences should be prioritized in terms of how conservation projects will impact on them.

This experience also reemphasizes the importance of differentiating the needs, interests, and characteristics of potential audiences whenever one establishes the content of messages, selects media, assesses the timing of releases, or determines reinforcement schedules (see Damlamian and Hadley, pp. 7-8 for an interesting discussion of these issues). Before proceeding too far with an information dissemination project, one is well-served to ask:

- Who are the potential audiences for any given information?
- What potential audiences have not been considered to date?
- What unintended audiences may receive the information and how might they use it?

- How could the information be used to the detriment of our goals in disseminating it?

Careful consideration of the cultural, economic, and political context in which potential audiences work and live is essential to effective market analysis. For example, some North Americans wouldn't even think to include the military on a list of target audiences for wildlife preservation. In contrast, conservationists in the Indian subcontinent often must work with the military because many important havens for wildlife are in remote areas accessible only to patrols along sensitive borders.

Environmental educators or publicists should also be aware of religious and linguistic customs in any given area. In Middle East or South Asia, this means not only knowing whether audiences are Jewish, Moslem, Hindu, Christian, agnotistic, or something else, but the sect or denomination they belong to. Thus, in some cases it may be crucial to know that someone is a Sunni rather than a Shiite Moslem--or a Catholic instead of a Protestant.

In any case, before formulating messages or mounting an information dissemination campaign, I work from a very broad range of target options (Landfried, 1984), including:

Governmental Audiences
Heads of State
Cabinet level officials
Middle-level federal administrators
State or provincial governors
State departments of:
 -agriculture
 -natural resources
 -forests and wildlife
 -environment
 -energy
 -transportation
 -commerce and tourism
The military and/or national guard
Wardens and guards at national parks and wildlife refuges

Education Audiences
Students (K-12, undergraduate, graduate, technical, adult)
Educators (teachers, curriculum coordinators, administrators, and school boards)
Subject area groups (science, social studies, reading, language)
Professional associations (teachers, administrators, school boards)
Producers of AV materials

Mass Media
Wire services (AP, UPI, Reuters)
Print media (Newspapers, magazines)
Electronic media--radio and TV
Feature films

Conservation Groups

International (e.g., WWF, Greenpeace)
International research groups (e.g., IUCN, IWRB, ICBP)
National organizations (e.g., Royal Society for Bird Preservation and Audubon)
State level groups (e.g., Wisconsin Wetlands Association or Citizens Natural Research Association)
Special interest groups (e.g., NRA, Tourism and Wildlife Society of India)

While this list may seem too extensive, it is certainly not all inclusive. As such, its purpose is to mitigate against tendencies to underestimate or overestimate potential target audiences.

Selecting the Media of Communication

Eventually one must address the question: what is the best way to communicate my information to others? Because the medium is sometimes the message (McLuhan, 1967), attention must be given in part to the interactive effect of any given medium on the information being communicated.

Until the late 1950's, environmental educators had relatively few ways to disseminate information. Today finds options more numerous and audiences much more sophisticated. In such a context, it is important to remember that high tech is not always best (see Boulton, p.6; Edmundson, p.4, and di Castri, et al.). Rather than becoming overwhelmed by the choices or the technology, I urge environmental educators and publicists who haven't done so to familiarize themselves with the strengths and limitations of various media. By better understanding what they can do to us--and for us--one is better able to decide what we can do with them.

Briefly, all media fall into two categories: single-channel and multi-channel modes of communication (see Travers). Single-channel mediums are perceived by one sense (e.g., hearing or sight). Telephones, phonographs records, audio tapes, and radios are single channel media which appeal to our ears. Eye-oriented single-channel media include art, photographs, stamps, and the written word. In contrast, multi-channel media like sound filmstrips, films, and television engage both the senses of sight and sound.

Sometimes there are significant advantages associated with "low tech" media which appeal to only one sense. Why? Single-channel media like telephones or radios force people to focus their attention in order to "get" the message (see Damlanian and Hadley, p.6, for additional advantages of poster campaigns). By limiting the available information, these modes of communication require greater concentration and reduce sources of ambiguity which may distract an audience (see Burns and Beier).

Indeed, the success of the Man and the Biosphere exhibits (Unesco, 1978, 1979, 1981, 1983) derive from the ability of its single channel graphics and powerful text to virtually draw people to see and absorb it. Similarily, audio recording of the songs of the great whales are more appealing than video tapes to some people because their sound conjure up such magnificent images in minds uncluttered with visual information.

Examples like these help explain why I ask myself these questions when deciding how to increase the power of messages transmitted to target audiences:

- To what extent is the impact of my message best served by certain media?
- How will each media mold my message? To what extent are those effects positive, negative, or undetermined?
- How can my message be best tailored to each medium?
- Do I have the skills and time to accomplish my goals for each medium?

Practical Considerations

Because technology is not uniformly distributed around the world, it is essential to assess what resources are available in any given area before selecting a delivery system. For example, some Americans (including myself) have discovered the hard way that video tapes recorded on the NTSC system used in the United States will not decode properly on the PAL system (used in some parts of Europe and most of Asia) or the SECAM system (found elsewhere in Europe an Africa).

Some of us have also learned from costly mistakes where technology has leep-frogged certain AV tools available in the West. In Pakistan, for instance, sound slide shows or films are impractical because Dukane and film projects are extremely rare. On the other hand, material produced on PAL half inch video tapes is useful because VCR's are fairly prevalent. Thus, to spare later grief at home or abroad, one is advised to conduct a proper investigation of resources available in intended markets before investing time and financial resources into the packaging of audiovisual messages.

An effort should also be made to ascertain which media are most effective in the area where the information is to be directed (see Schenk and Brown regarding problems associated with the use of computers and videodiscs in teaching situations). Where newsprint, radio, and television are prominent, it is highly desireable to establish good rapport with a writer or editor capable of getting material on news wire services. Associated Press in North America, Reuters in Europe, and The Press Trust of India are particularly good examples of wire services which communicate news to hundreds of sources. For environmentalists with limited publicity or promotion budgets, ready access to them is an inexpensive and indispensable guarantee of fast, reliable, and cost effective information dissemination.

Timing is crucial when dealing with wire services--especially when a story is somewhat esoteric. Typically there are two really bad times to approach a wire service: when a major story is breaking or during regular weekday business hours? Why? Because wire service staff are normally overloaded and have little time at such moments for anything but blockbuster stories. As a result, the best time to approach them is when all media are lack for stories: Sundays and holidays.

My approach, then, in my home state of Wisconsin is to call the local wire service office on a slow day to stimulate interest in a story. If the initial response is positive, I hand-deliver my release with photographers early in the afternoon. This gives the wire service staffer plenty of time to read, edit, type and transmit the story to the state desk in Milwaukee via computer telephone modem. Two or three photographs are essential because most professional photographers take Sundays and holidays off and with relatively few photos available, Associated Press may run the picture with a descriptive caption even if they don't run the entire story.

When the story is interesting enough, it is sent from the regional Associated Press office to New York for national distribution. In the case of my first major wire service release, the information was distributed on Christmas Day and soon appeared in papers around the world (Eggleston, 1979).

News editors like stories involving animals and youngsters--so any release which includes them will improve its viability. For example, students in my Contemporary Political Issues class at Stoughton High School produced a forty-two minute video documentary in 1984-85 about their research into five toxic waste dumps within seven miles of our school. The press became so fascinated with both the environmental and budding journalists sides of the story that extremely large spreads appeared on the front page of a Madison evening newspaper, (Allegretti, 1985), in an Associated Press national feature (Eggleston, 1985), and professional education journals (Landfried, 1985). In addition, the video documentaries were used repeatedly on nearby cable stations and thereby became a vehicle for community education themselves.

Indeed, these and other experiences with student generated material have been so positive that I urge environmental publicists to step out of the limelight themselves periodically and let the kids take over. With some direction and supervision educators, students at virtually all levels, grades 7-12, should be provided opportunities to study ecological relationships in their local surroundings--on school time whenever possible.

By using modern technology to record interviews with people having diverse perspectives on local environmental issues students in social studies or science classes can edit and organize the photograph, audio and video cassettes into "high tech" term papers (Eggeston, 1985). More useful than the old dust collectors of our school days, video term papers serve not only to make learning more relevant and engaging but to create a local resource which can enliven environmental education in schools and the community.

Well-balanced audio or video documentaries produced by students are tremendously impressive to adults and journalists as well--both of whom are likely to provide the students with various forums to spread the word about their research (Landfried, 1988b).

Evaluation

Evaluation, of course, is another important aspect of the information dissemination process. Clearly in this day of information overload, it is not enough to say: "I got it in the paper" or "It was mentioned on TV". Nor is the environmental publicists's job necessarily done because he or she has gotten material in ERIC files, on audio tape, or computer software. Certainly, these things are evidence of effort, but ultimately real measures of success have to do with whether the right people got and used the intended message, and, if it influenced their attitudes and behaviors in the desired fashion. After all, the proof isn't just in the pudding; it is also a question of what people do with it.

Success is often difficult to define, muchless measure. For that reason, diverse criteria should be used to assess the impact of environmental information dissemination projects. Selected on the basis of initial goals, use by the various media, and the impacts of the information on attitudes and behaviors, criteria to assess information use might include:

- how many times stories about the project appeared in print or electronic news media, journals, magazines, etc.
- when the material was used in meetings or public sessions with key decision-makers
- the number of people directly exposed to the information by the media, schools, libraries, AV presentations, etc.
- how often teachers, students, or patrons of libraries and ERIC files actually use the material

Impact criteria are also vital in determining the effects of the information on those exposed to it. Criteria to evaluate success in this regard include:

- attitudinal surveys of specific populations or the general public by polling groups (e.g., the Harris and Roper organizations)
- new public statements and voting patterns on the part of political representatives
- records of new laws or regulations which resulted from publicity campaigns
- evidence of compliance and/or prosecutions under new conservation laws
- changed school curricula
- changes in the status of wild animals, habitat or environmental quality in targeted areas

Meaningful evaluation of information dissemination efforts isn't easy--which is probably why it doesn't happen very often. Nonetheless, it is essential if we are to assess and improve our effectiveness in meaningful ways.

Summary

Effective information dissemination involves hard work, an ability to write, a sense of timing, luck, and an ability to keep things in perspective. More specifically, though, I think success in publicity and public relations reduces to an ability to keep these considerations in mind on a regular basis:

- What is the message or information to be conveyed?
- Why should this information be shared with others? What are the real motivations behind the desire to communicate it?
- What audiences could this information be transmitted to? Which should it go to?
- What is the best medium to transmit the information? Which other media may also be effective?
- To what degree are intermediates required to deliver this information? What are the chances of their misediting the material? Are the risks of a foul-up worth the potential benefits of sending the information through second or third parties?
- When is the best time to disseminate the material?
- How can the effectiveness of this campaign be assessed for each target audience? If so, how? If not, why?

Communciation is a tremendously complex process. Nobody perceives the world in exactly the same manner--nor do they encode or decode messages identically (see Bugental, et. al.). Indeed, the subleties of communication are so fine that even the most carefully constructed message runs definite risks as it is transmitted from one person to another (see Knapp). In short, we should probably always assume others will interpret our message somewhat differently than we intend.

For me, having a short but comprehensive list of questions near my desk underscores the inadequacy of the "you know what I mean" approach to things. Putting out ambiguous messages or carelessly disseminated information is an invitation to trouble--which is precisely what one doesn't need when trying to save a stream, protect an endangered species, or get another story into the mass media. On the other hand, systematic and imaginative approaches (see Blanchard and Jacobsen) can greatly enhance the likelihood of effective information dissemination.

Finally, I want to close by returning to the issue of information overload. Realistically speaking, an individual publicist or organization has only so many "chips" to play with the mass media during a given time period. This means that 1-4 environmental stories can be placed per year with wire services or the New York Times per year 5-8 with metropolitan media; and 12-15 in small town newspapers. But there is a limit to how much people can handle--even academicians, educators, and members of our own environmental groups. For that reason it is important to monitor the frequency and volume of the information one disseminatees. In this case, my eyes and my intuition suggest that enough has been said.

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COMMUNICATION - A "THIRD EYE" FOR GLOBAL CONSERVATION

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In today's world, the connections among communities, cultures, communications and conservation, hold great promise for the future. One runs a risk in sounding optimistic as some people lament that optimistic information cannot be taken seriously. There are signs that the world is coming together, if one observes how different parts of the world are connecting to address shared concerns and agendas.

In the 1980's, people became less awed by, and more cyncial about the capacities of national and international institutions. In many cases, people have again decided that the best remedies may often reside at the local level. They are opting to be off the "federal fix", (the intrusions of government), depending on it only to serve as the critical equalizer when all else fails.

A second important shift in public perception is reflected in a conversation I recently held with a 19 year old college student. She was describing the different groups that make up her class of 1989. She cited yuppies, jocks, preppies, gays, bookworms, geeks, foreign students, libbers, druggies, party types, townies, "Earthdogs", noting it was a good mix. Most titles I recognized, except Earthdogs. When I inquired she said - "You know, the sixties types, the hippies."

Whatever they are called, the very diversity she liked in her class was the legacy of the 60's. That acceptance of diversity by citizens at the grassroots has accelerated the mobilization of citizens at the community level, as well as nationally around specific causes, unleashing potent new energies when cultures coalesce to act.

The real celebration in the United States in 1986, at its 4th of July celebration, was its mainstream acceptance of diversity, a source of both national and local pride. At least, at these levels, Americans seemed to say to the world that diversity is a treasured social resource. The 4th of July event was, in reality, important evidence of the increased capacity of people at the grassroots to more readily contemplate their own membership in the global community. People have gained confidence in their own insights, in the worth of their varied heritages, and in there communities.

These two factors, the loss of institutional credibility at the national and international levels, and the acceptance of diversity, will restructure nations in the 1990's.

Again, as in many cultures preceeding the industrial revolution, the acceptance of diversity by the grassroots has increasingly come to include other species in nature. Concern for them and their habitats often share parity in political and social decision making.

The networks and systems of nature connect cultures and communities, and in many ways mirror human systems. Renewed recognition of this, in many industrialized nations, owes its status to mass media communications.

Mass media communications has amplified the actions and issues of national governments, local communities and groups of people. Television has accomplished something unique for the mass population. It has made people direct witness to the inner lives of communities, as visual presentations reveal the emotional and spiritual essence of communities in nature and among people. Television has ignited and expanded the human capacity for empathy by sharing its visions, simultaneously around the world, whether of drought in Africa or a royal wedding. Television reveals the abundant gifts of both nature and peoples, as the common heritage for all.

As visions unfold before us on the TV screen we see, too clearly, the sad consequences of what can happen when economic and environmental concerns are treated separately at the community level. We witness the high social and economic cost of becoming experts or specialists, locked within disciplines of geographies, refusing to cross boundaries to realize the potential of integrative thinking. We see that few engineers understand the workings of natural systems. Fewer economists bother to assess the carrying capacities of natural resource systems for their GNP projections. Through television, we witness as well, the human and environmental cost to all communities when plowshares are turned to swords.

Through what we view on television, we realize that traditional educational systems have not devised a matrix which teaches skills and imparts knowledge across disciplinary lines. This failing pre-empts conceptual shifts by which we can better define the present and the future. The chasm between the hard and soft sciences is growing, not shrinking and the wall between the scientist and the politician seems impenetrable. Tragically, these intellectual and academic chasms have been exported worldwide.

Today, television is the main, and often the only, bridge among disciplines, integrating our world view across subjects, publics, and geography. Uniquely, as television connects our emotions to our "knowledge", it provides stunning challenges to conventional wisdom and new insights.

Mass communication is causing more and more people to confront the ultimate reality; each person is at the center of ever widening concentric circles of communities that include us whether we choose to be included or not, disciplines and issues connect to affect us whether we choose to connect or not. Television coverage of local news reveals nightly, how the world embraces each of us from the grassroots to global level. We begin to understand Rene Dubois' adage to think globally, but act locally.

Love Canal was local, but its environmental impact migrated outward and upward through state, regional and national communities. The media took us on this journey. Chernobyl and Bhopal moved quickly from local tragedies to loom in our living rooms as they engulfed the globe with consequences. The media, as a witness for nature, conveyed the consequences of these tragedies. From our own communities, we witness local and international traumas in villages and capitols in distant lands. The consequence is that we discover, blooming within ourselves, empathy for battered lives and species, heretofore hidden from view. Our sense of kinship is expanded as our potential destiny is mirrored.

Today, through television, perceptions quickly shift from self defense, to guarded observation, to attentive witness, to emphathetic sojourners. Other people and forms of life become real to us, tough our spirit, and give rise to compassion. Compassion is the energy unleashed when suspicion caused by ignorance of others is removed. Television can instigate peoples' emphathy for the starving - be it a herd of antelope prevented from food by barbed wire fences, or an African child starved by a bankrupt environment, activating our wellspring of compassion. When compassion is multiplied by audiences, it gives rise to global outpourings such as we witnessed with Band Aid, Live Aid, Farm Aid and Hands Across America. The alliance of citizens around the world, through media, can rise up under the bellies of institutions when they are unresponsive or inadequate to the times.

What we are coming to recognize is that mass communications gives humanity its sixth sense - "a third eye". Many in our children's generation have not known of life without the "third eye". Through it, they share a common global culture of blue jeans and music, or hairdos and videos. We need not fear this.

Not long ago, in the United States, people defined themselves as Bostonians, or Southerners, or Virginians or Westerners. Slowly, but steadily, people learn that communities can be different from each other, but yet share parity; this is expanding to embrace the globe and other forms of life.

Today, we witness the convergence of cultures, communities, and citizens through mass media, providing promise for generating new levels of both regional and global consensus. Many in the world are desperate to find a framework for rational unity among human cultures and with nature. Perhaps communications, particularly television and videos provides this framwork, as they are able to reveal common challenges and visions. Visions begin with the Earth, its natural resources and ecosystems - the universal common ground for gaining consensus among communities and cultures.

There is little room left for cultural or community chauvinism in the world, a chauvinism which seems to require the destruction of others. The need to learn to think and analyze, across and among disciplines and cultures to find new visions is urgent. There is little patience among the grassroots who struggle to fix what is broken, to feed those starving, to heal the wounded. There are only benefits to be found in being partners with each other and with our plant.

Fortunately, the media is defying our lack of vision and our cultural ignorance. It is freeing us to recognize the common bonds among all species. Television challenges us to march away from age old suspicions of our neighbors. The "third eye" of television creates strange convergences of new understanding. We see global environmental problems such as acid rain as both international and local problems, or as the aggregate of neglect at the local level, or at a specific plant site.

Empowered by medias connecting local to global communities, we grope towards a "conserving society." Exposed by the "third eye" of television, national governments will be increasingly compelled to act. The "third eye" has demystified the world - creating neighborhoods out of continents. The "third eye" shows citizens how connected their own backyard environment is to the world's well being, forcing re-evaluations of foreign policy, economics, foreign aid, and other public policy issues. The aggregate impact could lead to an actual reduction in overwhelming global agendas.

Through the world's media, we are challenged to rethink the future, to expand our capacity for compassion, as well as our intellect, and to conserve the future.

ENFRANCHISING THE SILENT MAJORITY TO RESOLVE ENVIRONMENTAL DISPUTES

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In summary, I believe that, in the face of mounting environmental hazards, we need to revivify the democratic process by stimulating the usually silent majority to become interested, informed and involved in resolving environmental issues.

Situation

Particular interest groups (PIGs) are increasingly making a mockery of the democratic process. Whether the issue is pesticides, nuclear waste, garbage disposal, abortion or some other issue, PIGs ignore the needs of the larger community and run roughshod over its established ways of doing things. The silent majority remains disinterested, ill-informed and inactive.

As the protagonist and antagonist battle it out, the larger community is a neglected third party whose support is claimed by both, but nurtured by neither. After several experiences of PIG tactics, the average decent citizen is frustrated, alienated and increasingly likely to withdraw from the democratic process and community activities.

Causes

1. The changing economic, social and political climate. We used to have relatively small communities with a slow rate of social change, a fairly homogeneous population, a respect for authority and general satisfaction with life. Community decisions were made through a largely consensus decision-making process. Today our communities are likely to be large, experiencing rapid social change, including a wide range of people with different ideas and aspirations, more skeptical of authority and harbouring a good deal of generalized hostility and anxiety about the uncertain economy, the prospects of nuclear problems and other concerns.
2. The breakdown of community institutions. In former times, community stability was based on the family as a basic building block, the school as a unifying focus, the church as a centre for clarifying values and setting goals, and recreation is often a community-wide activity.

   In many cases, these institutions are in disarray, "me-ism" is rampant, recreation is largely individual, passive and professionalized and over all hovers the threat of nuclear holocaust, the national deficit, world debt and other global threats.
3. The loss of the sense of community. As a result of the above, the sense of identity people have with their community is weak or non-existent and no one is taking responsibility for carrying out repairs and maintenance on community cohesion.

Strategy

In the short run, an environmental group can organize a campaign to fight a specific issue but, as noted earlier, the result may be that it wins the battle but loses the war - in this case, the informed support of the larger community for future community decisions.

A more comprehensive and lasting strategy is to recognize the nature of "community" and nurture it so that environmental and other specific issues are seen as everyone's business and not the special preserve of a small group. For example, viewing the community as a social system in which there is a dynamic equilibrium amongst a number of interest groups.

Action Planning

1. For prevention, assess the network of community institutions and work to strengthen them and their shared and visible commitment to the well being of the whole community.
2. To repair deteriorated community structures, consider involving the active organizations in a community goal-setting activity as modest as a one-day "Day of Discovery" or a more substantial exercise like the classic

"Goals for Dallas" or "Hawaii 2000".

3. To resolve an active environmental dispute, apply a model which:

   - identifies the nature and dynamics of the community;
   - provides readily accessible opportunities for ordinary people to become interested, informed and involved in a joint problem solving process, both as individuals and members of organizations;
   - recognizes the role and responsibility of local government to make final decisions on community issues.

This model is illustrated in the following case.

Sand Disposal in a Coastal Community

Introduction

Steveston is a small community at the mouth of the Fraser River in the Greater Vancouver area of British Columbia; each year, some half a million cubic metres of sand is removed from the river by a hydraulic dredge to maintain an essential navigation channel. When the former disposal site was taken for a park, the Fraser River Harbour Commission decided to pump the sand on to an adjacent island and build a small bridge so the sand could be trucked to construction sites on the mainland.

Controversy

This sand disposal generated considerable opposition from environmentalists who saw the rape of a sanctuary, from residents along the new truck route, from fishermen and businesses affected by blowing sand and others who felt the Commission's action was highhanded.

Program

The main elements in the program to resolve this environmental dispute were:

1. The preparation of a social profile of the community to identify its history, leaders, organizations, other issues, attitudes to growth, communication channels and, finally, people's knowledge of and attitudes to the Fraser River Harbour Commission and its sand disposal proposal.
2. A flyer published in the local newspaper describing the situation, acknowledging community concerns, outlining alternative solutions and inviting people to both return a coupon with their views and to attend an Open House the following week.
3. An Open House where those interested could obtain more detailed information and discuss their concerns and suggestions on a 1:1 basis with Commission staff and others involved with the project.
4. Two planning workshops with a dozen leaders of community organizations; one was held prior to the publication and another after the Open House. During the final workshop, a six-point package solution was proposed by one group

leader, accepted by the Commission, and other government officials involved and endorsed by all the remaining group leaders.

Success Factors

Some of the factors responsible for the resolution of this environmental dispute were:

1. A sound social data base was established through the social profile for planning and managing the subsequent program.
2. Interviewing key people for the social profile established trust and credibility with many who were alienated from the Commission.
3. The Commission and other government agencies acknowledged the residents' concerns and worked hard to resolve them.
4. The group leaders were informed about the technical aspects of dredging, participated in the joint problem-solving process and took a community-wide perspective in seeking a solution. In one crucial moment in a planning workshop, other group leaders exerted peer pressure on environmental leaders to accept some workable compromises for the sake of the whole community.
5. The publication and Open House were readily accessible opportunities for ordinary citizens to obtain understandable information and express their views without being subjected to social pressure, e.g. traditional public meetings.
6. The issue was transformed from an environmental issue appealing to a relatively small segment of the population to a community issue in which all had a stake.

Note - this case study is summarized from a more detailed account which, along with descriptions of the techniques referred to and other material are contained in the reference listed below.

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MAKING NATURE'S WISDOM PUBLIC: THE AFFIRMATION OF PLANET EARTH AS A LIVING ORGANISM

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Although born and raised in city environments, I've lived the last two decades outdoors. As a resident of these two different settings, environmentally, the forthcoming information age troubles me.

At great personal risk in 1959, I founded and nurtured an outdoor program that grew into today's accredited living earth studies of the National Audubon Society Expedition Institute. Our campus is wild America and its subcultures; our teacher the life experience itself. (Cohen, 1975) During all seasons I camp out, sleeping on the ground, sometimes in tents, often under brilliant fall and winter stars. My home of wind, hill and sky reconditions me to its ways. (Cohen,1983) Some say I've been in the woods too long, but our environmental problems state too many of us have not been there long enough.

Scientists claim that my present home, the natural - including geological - lifesystem existed for five billion years before humankinds appearance. Through the eons each entity - sub-atomic to continental - desired mutually beneficial survival relationships with other entities. Establishing these relationships created and maintains the global life system. By the time humanity evolved as a species, the planet's matter of itself had long established global life.

By relating and sharing information, the self-organized earth community experientially preserves and regenerates itself. You can sample nature's information process. Hold your breath. The stress you feel building informs; it urges you to breathe, while telling of your physical and emotional connection to air. Suffocation sensations state that just as you need air, the natural world needs your breath. If you become unconscious, your ancient partnerships with nature insist you breathe without you willing it. When you finally inhale or exhale, your joy informs you of nature's presence and power. (Cohen,1983)

Planet Earth as a Living Organism

In the late 1960's the natural world for an instant cracked a firmly established wall in my mind. Against all my upbringings, it set me thinking of the planet as a living organism instead of as a Cartesian resource or inert, machine-like Newtonian spaceship. Freed by the wilderness, my curiosity asked: if salts and sediments continually run into the sea (doubling its salt content every 90 million years), why has not the sea a lifeless, concentrated salinity as does the Great Salt Lake? Similarly, what informs my body to regulate its salt content from my potato chip intake? As in my body, isn't there a homeostatic wisdom of the planet that sustains proper temperature, oxygen and carbon dioxide content, radioactivity, and proper light for life's existence? Through the Gaia Hypothesis, many scientists now confirm this notion.

My breathing and other inherited biological urges suggest that I evolved as part of a living entity, not a dead one. Feelings and growth are functions of life. I didn't inherit them from a dead planet, for dead matter neither senses nor grows.

In summary: I find my traditional city upbringings contaminated my mentality by limiting it to habitual Cartesian thinking. Extended living and learning in natural and subcultural settings teaches me that like myself our planet-organism pulsates and senses. The earth is a giant self-organized, warm-blooded cell, a collective ongoing statement of each wild entity's desire to relate, preserve and regenerate itself. The earth organism shares information through sensations, feelings and actions, not through the incomplete abstractions and symbols I was taught. (Cohen, 1986)

Origins of Environmental Problems

Scientists tell us that humanity evolved in a tropical, womb-like environment -- probably East Africa. There more intense consciousness and tool use were early people's major adaptive devices.

Obviously, when these early humans migrated from East Africa into the more Northerly four-seasoned environments, they experienced a greater survival stress. Their hairless bodies and cultural habits had evolved to share the supportive East African climate, not the food-scarce temperate winters.

Some migrating groups coped with seasonal challenges nomadically. They moved to warmer places during the winter and to new food areas when they depleted old ones, allowing depleted food areas to renew themselves. *Knowledge became an erotic consciousness* of what, when and where food and shelter was available. Their lives flowed with nature's sentient callings and events. Because my upbringing and education never taught me their outlooks and rituals, I conclude that these nature - harmonic peoples were not my ancestors.

My ancestors were other East African migrating groups. They pioneered modern civilization by divising a different means for survival. Unlike their counterparts, they didn't learn intimately from their new habitats and flow with seasonal temperatures and food conditions. Instead their memories, myths and feelings *intellectually* kept alive the womb-like relatively stable and supportive old East African memories on their new climatic surroundings and changed that landscape. Instead of joining natural system's ancient ways; they civilized them. *They learned to primarily worship their stabilized survival ideas and technologies* rather than the more *fluctuating and erotic natural world.*

For these pre-western cultures the earth's life systems became grist to build artificial East African type environments anywhere. Today western civilization with its powerful symbols, images and technologies alarmingly juggernauts into the natural world. The natural entities and native peoples we pry or blast out of their ancient life partnerships often can't find new partners. They become garbage, pollutants or eradicated. (Cohen, 1983) Unfortunately, in our society people who dig wilderness the most have bulldozers.

Stressing Nature

Prenatally and at my birth, I knew only the earth's callings such as hunger, thirst and love. But during my childhood western information instilled in me our culture's nature-abandoning "East African" tendencies. For example, it trained my hunger for food into habitual desires for money, cultivated land, transportation systems, advertising, food stores, ornate packaging, ovens, refrigerators, silverware and table manners. Carved and conditioned at home and school, my inborn global consciousness learned to demean nature including itself. I suggest we cause environmental problems by subconsciously treating the natural world as was our inborn nature treated during childhood. Americans excessively feel stress because we learn to think habitually in nature-abandoning ways. This causes our inborn nature to feel abandoned. It responds to that stress with agression, anxiety, or depression. And because objective science usually excludes our feelings (nature), science becomes part of the stress problem.

Average Americans spend over 95% of their lives indoors. We know the natural world not by our experiences with it, but by information describing it. For example: People discovering the undefinability of life confess to not knowing what life is. Even though they are life, they've learned to know themselves through information and technologies, not experiences and feelings. Until we use holistic processes to reverse our artificial lives' problems, we attempt to solve them with the same information that caused them. It's like drilling a hole in the floor of a leaking boat in order to drain out the water. (Cohen, 1985)

The Responsibility of Information

Unlike traditional academics, experiential learning evokes feelings and actions as well as thoughts. That's why experiences are the best teacher. But to avoid stress and habitat destruction, experiential education must reunite our inner nature with the sentient living earth. Only when experiences, feelings and nature synchronize does our mentality touch the earth's wisdom giving us life's regenerative powers. Only then do we learn that the stress on the land and wildlife is the same stress we suffer. Most urgently we must recognize:

1) planet earth as a living organism
2) all feelings originate in nature
3) biologically and emotionally the living planet exists inside ourselves. What happens to it, happens to us and vice versa.

At our Audubon Institute, expedition education reverses our exploitive East African tendencies. It encourages our students to choose acts that:

1) recognize planet earth as a living organism which inhabits us biologically and emotionally.
2) validate our natural sensations, feelings and reverence for life.
3) emanate from conscious decisions to express our natural feelings with respect to the planet organism rather than to our nature-abandoning East African memories.
4) satisfy our natural feelings without excessively using technologies.
5) engage in technologies and lifestyles which harmonize with

nature.

6) satisfy our natural survival feelings rather than our acculturated feelings.
7) are based upon choice rather than habit or conditioning.
8) celebrate the natural world within and around us.
9) recognize cooperation and peace as functions of nature.
10) feel comfortable when measured by our long-term effects on nature and humanity.
11) teach us about our shared nature and kinship with planet earth as a living organism.
12) recognize, confront and subdue our cultural fears and prejudices against nature within and without.
13) refute media messages that demean or victimize nature within or without.
14) make life and the landscape sacred.
15) give us security based upon our ability to create good feelings about ourselves as members of the global life community.
16) establish stress resolution settings that identify our nature, emotions and experiences with those of the living planet.
17) establish nature congruent, life-reverent symbols, communities, interpersonal relationships and wilderness experiences.
18) make physical and psychological space and time to reconnect our nature within to the wilderness community.

I and the Audubon Expedition Institute welcome opportunities to establish and support any organization's efforts in these directions. Let's make sure the information age does more than reinforce our inappropriate East African tendencies. Honor our oneness with organism earth by using its voice; make our kinship with the planet known through thoughtful, feelingful acts.

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COVERING THE THIRD WORLD -- AT HOME

John Maxwell Hamilton
Main Street American and the Third World

Frank Skeffington, the fictionalized mayor of Boston in The Last Hurrah, held a clear cut view of American interests abroad: "When you get right down to it," he said, "There are only two points that really count...One... 'All Ireland must be free' ... Second, 'Trieste belongs to Italy.'"

That view may have made sense in a different era. It doesn't today. Countless nations -- and increasingly those seemingly distant countries that make up the Third World -- shape Americans' lives in countless ways.

Just look at national trade numbers. Foreign trade accounts for about one-fourth of our Gross National Product. That's a big increase. Between 1954 and 1963 trade accounted for only 7.9 percent. Moreover, the Third World share is up even more dramatically. Today we have as much trade with the developing world as with Western Europe and Japan combined.

Look, too, at national security issues. The major conflicts since World War II have come in the developing world, one way or another: Iran and Iraq; Nicaragua; Cuba; South Korea and Vietnam; the Horn of Africa. Dare anyone suggest that these have not involved Americans?

At the national level there are plenty of people who look at these connections. USDA watches the Indian monsoon to predict farm exports. The Teamsters have recently put an office in Taiwan.

But at the local level these connections just haven't clicked. There is lots of talk about an interdependent world. But ask an American if he feels that interdependence with other countries -- particularly those in the developing or Third World -- really touches HIS life. You are likely to get a blank stare.

Americans generally think about their interdependence with the Third World in much the same way smokers think about lung cancer. They know the connection exists -- but not for them.

In a poll we did in 1984 in Hattiesburg, Mississippi, 86% of the respondents agreed or strongly agreed that what happens in one country influences another country. Less than half that number (42%) agreed or strongly agreed that economic growth in poorer countries promotes economic growth in Hattiesburg. A 1985 poll in Richmond, Virginia, showed roughly the same thing.

Clearly this is intolerable in a world where our lives are so clearly intertwined with those of people living in faraway lands. Just as clearly, responsibility for educating Americans rests with us, the American press.

During the past year or so, the Sigma Delta Chi Foundation of the Society of Professional Journalists has been working on a project to help journalists improve news coverage of developing countries. The Carnegie Corporation, and the Ford and Benton Foundation fund the $235,000, two-year program. Simply put, the project has looked for ways of reporting on the Third World without leaving home. But more than a simple statement is needed to explain what we are doing. Our premise is that interdependence is so real that it actually touches peoples lives in daily, observable ways. Morevover, those connections lead to hard news and features stories that people will read.

Main Street America and the Third World, the book that you have in front of you, provides real examples of these connections and suggests ways that you can do the same thing in your own community. But to give you a quick glimpse of the kind of angles you might want to look at three stories put together for this project by WSAZ-TV in Huntington, West Virginia.

These angles only begin to touch the kinds of connections that actually exist.

Consider, for example,

- that the president of a Keene, New Hampshire, industrial printing equipment company cares about a new Malaysian consumer protection law? (The law requires that food processing companies put dates on their products...which means it will need to import printing equipment.)

- that Duluth, Minnesota, longshoremen put food on their tables because of U.S. food aid to Third World countries? (Half of longshoremen's annual working hours involve loading food sent by the U.S. government to poor people overseas.)

- that an entrepreneur is planning a telephone answering service for Midwesterners using operators based in Montego Bay, Jamaica? (Saztec, in California, has already used keypunchers in the Phillipines to assemble patient records for 80 U.S. hospitals and to code the entire Pacific telephone system.)

Our investigations have yielded lessons that transcend journalism. First, U.S. - Third World interdependence is only just beginning. Second, growing interdependence offers both opportunities and pitfalls, depending on whether Americans are in command of events or overtaken by them.

Consider some of the problems and prospects presented by interdependence. One is learning how to work in the international environment. Take the case of my hometown of Aurora, Illinois. As is happening all around the country, one local company -- a pump manufacturer -- has recently opened a five or six man assembly operation in Singapore. This is one of the first steps by the new international sales manager the company recently brought in. Another Aurora company has gone through rough times. It manufactures heavy earth moving equipment and once did 70 percent of its business in developing countries. Now it is doing 15 percent. The shock of this transition, which is the result of Third World debt problems, the strong dollar, increasing international competition, has turned the once family controlled company upside down. Farmers in Hunt County Texas are having the same problem. In the 1970s many started to raise wheat, nearly all of which was for export. Today those markets have begun to shrink and farmers are going out of business. In the process, the terms of reference in farming have changed dramatically. Once a man could tell if his neighbor was a good farmer simply by looking at his fields and the crops growing on them. Not today. As one Texan told me, "Farmers used to spend 364 days a year growing crops and one day marketing." Today he must be a shrewd businessman, one hand on the wheel of a tractor, the other on a computer keyboard checking international quotes on prices for his crops.

Third world poverty makes a difference in all sorts of ways. In Winter Haven, Florida, a mysterious strain of citrus canker from the Third World currently threatens the state's fresh fruit industry. When I visited last year, USDA had just burned the biggest citrus nursery in the state to the ground.

Citrus Canker is only one of scores of diseases and pests that have come into the United States from Third world countries. Although all countries can export their problems, Third World countries offer special risks because they are poor. They often don't have the facilities to spot problems quickly or to cure them.

Some diseases may also be a result of large concentrations of population. All the major flu epidemics of the past years have come -- as their names generally imply -- from Asia. The reason is that flu comes from fowl, who give it to pigs, who give it to people. And thus the greatest likelihood of flu outbreaks is where large concentrations of humans come into regular contact with birds and pigs. That is in Third World countries.

This said, it is important to mention that Third World countries are also a major contributor to American agriculture. You could just ask David Stock, a seed dealer in Murdock, Nebraska, and a former Peace corps volunteer. As Stock knows, the United States may have been blessed with good land but not with an abundance of the crops that we harvest today. The sunflower is American. But potatoes come from Peru; corn from Central America; wheat from the fertile crescent; soybeans and citrus from China; sorghum from Africa. We are heavily dependent on these countries for the genetic material used to create improved crop varieties that produce higher yields and are more disease resistant. We have every reason to worry about the depletion of the world species in this abundant gene pool as a result of environmental degradation.

Brad Korell at the National Bank of Commerce in Lincoln could give you another angle on interdependence. His bank has an international banking department, but unlike the executives who run Citicorp or Chase, Korell is not worried that Third

World countries will default. He worries that commercial banks responsible for the big loans of the past decade will not continue to lend. The reason is this: First, NBC did not make any of those worrisome foreign loans. Second, the decrease of farm exports to developing countries has contributed to farm failures in Nebraska. NBC which went for years without a farm related default now has some 60 of its write offs going to farm failures. The solution, as Korell sees it, is for commercial banks to maintain lending levels so that developing countries can make the capital investment to get back on their feet.

There are angles that we have only begun to develop in our book. The insurance industry is one. How much of a difference does it make to local rates that an Indian airliner goes down or that an earthquake erupts in Colombia? Drug problems in our high schools can be traced to poor farmers in Latin America who need a cash crop. The list could go on. If you have any additions, I'd like to hear them. Our hope is that this project will continue to provide answers, rather than just supply them.

That said, it is perhaps worth noting some of the lessons we have learned in the course of this project.

* Just because it doesn't seem at first that a story idea will work in your community, don't rule it out. Almost every story in Main Street America and the Third World could be done in any community. To prove that, I made no effort to choose ideal localities to do stories. In a couple of instances, it appeared that the real news was that Third World connections were decreasing or not important. But even that can be news.

Consider the case of foreign investment in Dallas. In the late 1970s, people worried that the OPEC dollars would take control of the local economy. It didn't happen -- and in 1986 the people of Dallas wished Third World investment would increase and revive the sluggish real estate economy.

The News in Southbridge, Massachusetts, found that relatively few local companies were involved with Third World trade. Most were simply afraid to try something new. The newspaper performed a public service by explaining the growing importance of trade and suggesting how companies can get involved.

* Don't assume that only large daily newspapers can use these techniques. The newspapers that worked on the stories in this volume range from The Hopewell (Virginia) News, circulation 7,000, to the Dallas Morning News, circulation 378,000. Contributors also included the nationally circulated Christian Science Monitor as well as the twice-weekly The Holton Recorder and two nearby high school newspapers in Kansas. You've seen that it can be done on television.

* Don't think you have to be a seasoned foreign correspondent or international economist to tackle these stories. Young journalists in their first reporting jobs wrote some of the stories in the book. As described in an appendix to the book by Medill School fo Journalism Dean Edward P. Bassett, some of the best ideas for stories came from students

at Northwestern University, which experimented with these techniques in the classroom during the 1985-1986 school year. As A.J. Liebling once put it: "A good reporter, if he chooses the right approach, can understand a cat or an Arab."

• But once that foundation is laid, reporters can incorporate Third World angles into their regular reporting. When writing that routine September story on enrollment at the local university, think to ask if the numbers of foreign students are up or down. When interviewing the new president of the largest local business, ask him how he views export possibilities.

Many of the pieces in Main Street America and the Third World fit with on-going news events; many were written under deadline pressure.

• These stories can be used to get below the surface, to see the larger context of foreign events. In that university enrollment story mentioned above, reporters can ask why Third World student-enrollment has changed. Is it up for students from countries with booming economies? Is it down for those whose governments have balance of payments problems?

• Sources of information are aboundant, once you start looking. Main Street America and the Third World has an appendix, keyed to each chapter, that suggests national organizations that can provide general background and local authorities. Hometown experts can help fill in the picture. Many journalists will find that they already have these names in their Rolodex but have not used them as sources for information on the wider world.

Local bankers know who is exporting, who is importing. Increasingly states and even communities have created organizations to promote trade and investment. Agricultural extension agents can comment on the importance of Third World countries to local farmers. Universities have experts on every kind of Third World tie, from the impact of developing countries on American joblessness to the importance of Third World raw materials to the United States economy.

Once reporters start looking and asking the right question, the list of local experts seems unlimited: church leaders, former Peace Corps volunteers, travel agents. Even your barber may be a source of information, as I discovered in Hattiesburg, Mississippi. The local barber shop had one barber who had just returned from two years in Fiji, where he taught barbering. The woman next to him had grown up in Asia, where her father worked for an oil company; another women was from Central America.

• Finally, Americans are deeply interested in stories tracing Third World connections. Two polls were conducted in connection with stories developed by the Hattiesburg (Miss.) American and the Richmond Times-Dispatch. As described in an appendix by John Mauro, director of research at Media General, those "before and after" surveys showed that Americans will read Third World stories and that they want more of them -- and that their views on interdependence are changed as a result of such reporting.

I've covered a lot of ground, I know. But this should give you an idea of the connections that we've found and how to track them down. In closing I should say two things. First, the project is meant to be a resource for all journalists. If you want to pursue some of these angles and want some assistance getting started let us know. We'll do what we can. Second, we also think it is critical to work with journalism schools. They can use these techniques in the classroom. In fact, they introduce young students to aspects of their community that they might otherwise overlook. The techniques are also useful in their first jobs in smaller media markets.

As I said, the most remarkable lesson of all in this project has been that it can be done -- and that the connections are more real and immediate than most of us ever dreamed. Frank Skeffington simply no longer makes sense. The question is whether we will provide the tools Americans need to deal with the interdependent world they face today.

Thank you.

GLOBAL CITIZENSHIP IN AN INFORMATION AGE

by Donald R. Lesh, Director
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Washington, D.C.

It's a great pleasure for me to be able to join you here in Eugene for the annual Conference of the North American Association for Environmental Education, and I am particularly grateful to Jerry Berberet of Willamette University, John Baldwin of the Univeristy of Oregon, and the other NAEE organizers, for this opportunity to share some thoughts with you.

The organization I represent -- the Global Tomorrow Coalition -- can't yet claim to be a household name, but we are honored to be able to serve as cosponsors of this Conference. Founded in 1981, the GTC is a tax-exempt national alliance of nongovernmental organizations, now numbering over one hundred, devoted to a wide spectrum of issues. Our member groups, mainly non-profit organizations and some for-profit corporations, have come together on the basis of shared concern about long-term global trends such as rapid population growth, unwise resource use, environmental degradation, and unsustainable economic development, as well as a belief in the need for more dynamic and creative United States leadership in the search for solution to related problems.

We carry out a variety of national programs from our base in Wahington D.C., but I am especially happy to note that we also have a small West Coast office in Portland, Oregon, which grew out of the very successful Globescope National Assembly organized and conducted in Portland in April, 1985. The individual most responsible for initiating that Globescope conference was Diane Lowrie, who now heads the GTC/West office and is with us here in Eugene. I hope that those of you who are from this region have been able to meet and talk with Diane, because we would very much welcome your continued contact with the Global Tomorrow Coalition through our Portland office.

Global citizenship -- a ringing phrase -- but does it really exist? My own answer is an unequivocal yes, and I have the feeling that most of you in this room would agree. But I think we need to remember that many people in the United States and elsewhere in the world might not share that view. And we need to respond to the challenge of defining what "global citizenship" means, and explaining why it is vital to our future and what its implications will be for the values and substance of the field of environmental education, as it has developed in this country at least since the first Earth Day in 1970.

My observations tell me that things are happening all around us in our society that confirm the slow emergence of a sense of global citizenship, or will make a contribution to it and I will share some of that evidence with you later in my remarks. Am I satisfied with the pace of this change, and the scope of the process? No, by no means -- in fact, I am afraid that many of the global problems we face are outrunning our perceptions of their complexity and seriousness, and may well overwhelm our limited capacity and even more limited commitment to deal with them in time. But some encouraging signs of progress are appearing and they ultimately may have great influence on the policies and programs of the United States, the institutions and patterns of our society and economy, and indeed our own personal values, practices, and lifestyles. This movement will also directly affect the ways in which we educate our children, specifically through the discipline of environmental education.

First, however, let's remind ourselves what we are talking about when we speak in shorthand of long-term global problems. In the brief time we can spend together this evening, we can't go into great detail on any single issue. Besides, I'm well aware of the fact that in this room there are undoubtedly many who are far more expert than I in all these areas. But I feel, nevertheless, that a few reference points will be valuable. Let me hasten to acknowledge that I will rely heavily here on a number of familiar sources, especially the outstanding publications of the Worldwatch Institute led by Lester Brown and the useful analyses of commentaries of Gus Speth at the World Resources Institute. Both, I am grateful to note, are affiliate members of the Global Tomorrow Coalition and their staffs and publications figure prominently in our programs.

On each of these global issues, we do know a good deal, and important research is under way, but even the experts, I am sure, would concede that we still have a great deal to learn. We are trying to confront problems that are complex, long-term, global in scope, and dynamically interactive over time, and no one would, or should, claim that we yet have all the final answers.

First, let's consider rapid population growth, because that, I would submit, is the major motor force driving virtually all other long-term problems. Let me cite some of the recent data from the Population Reference Bureau, the central collector and purveyor of demographic information drawn from the most authoritative sources and again, I am proud to say that PRB is an Affiliate Member of the Coalition.

PRB has described ours as a time when world population growth is historically at both its most rapid and most uncertain levels, most rapid because of the absolutely unprecedented momentum of the worldwide population increase during our lifetimes, and most uncertain because it is still far from clear how quickly the all-important transition to lower fertility rates will occur in the developing countries of the world where the most rapid growth is now taking place.

Most of you know that during this year, 1986, the world is surpassing the five-billion mark in population. Exactly when that momentous line was crossed, or will be crossed, will be settled later by the experts, when all the census data is in hand. But, there seems little doubt that our human numbers on earth now stand at roughly five billion.

We need to remind ourselves, therefore, that it took all of recorded human history for the world to reach the level of two billion persons around the time of the First World War. It then took only 30 years to add a third billion humans, by about 1950. The fourth and fifth billions (actually, to be precise, 2.3 billion) were added in the 35-year period from 1950-1985. And we are now in the process of adding a sixth billion in just the 15 years until the year 2000, when the consensus projections from every source agree that the world population will stand at close to 6.1 billion. By 2020, only 35 years from now, the expectation is that our human numbers will be near the arresting total of 8 billion.

It's also significant that, of the projected population growth through the year 2000, some 90 per cent is expected to occur in the developing countries of the world, precisely those countries that in many cases are already hard pressed to meet the basic needs of their people today. Another striking way to represent the momentum of demographic change is to look at the absolute annual increment. Last year, for example, the world grew by roughly 85 million persons the equivalent of another Mexico. And this year there will be another Mexico, and next year, and the next...

We're well into the political campaign season of 1986. A U.S. Senator elected this fall will begin his or her term in a world of five billion people. If that Senator serves two and one-third terms, about 14 years, another billion will have been added. The population of the United States is now about 240 million people. By the year 2000, it is expected ot be around 268 million. But, by that time the combined populations of the developing countries of Asia, Africa, and Latin America will stand at 5.1 billion.

The statistics themselves soon begin to pall. But what we really should be thinking of is their implications for global demand...demand, fed both by growth in human numbers and rising expectations for quality of life, for: food, housing, medical care, education, employment, energy, transport, clean water and clean air, recreation and cultural fulfillment.

Is this only "their" problem, those people "out there" in developing coutries, far from us, with different colors of skin from those we see in the majority here in the United States? By no means. Not only is the U.S. future ever more closely linked to the progress and prosperity of the Third World -- roughly 40 per cent of our current trade is now with developing countries and by the year 2000 that proportion is likely to rise to 50 per cent -- but we in the United States also have a population challenge. We're still one of the fastest growing of the industrialized nations, despite the fact that our fertility rate is down to around 1.8, or approximately at a stable replacement level is maintained for 70 years. Right now about 50 per cent of our annual population growth in the United States stem from immigration, both legal and illegal, and these pressures, of course, are growing constantly more acute.

We also tend to forget that the impact of population growth is usually highly selective. Take the example of the state of California which had 23.7 million residents in 1980. By 2000, there are expected to be 31.9 million Californians, and by 2030, some 42.7 million. And a good proportion of these I daresay, will be thinking of moving north to enjoy the open spaces and quality of life in Oregon! I should stress that these figures exclude the factor of illegal immigration, since there are such widely varying estimates of those numbers. The projection assumes only 600,000 legal immigrants per year into the United States; some would argue that the actual figure for total immigration is now twice that high.

What do such numbers mean to us? What choices do they imply? What social and economic costs? What demands and pressures on the environment?

But rapid population growth is only one of the major global trends about which we are concerned, though it does materially affect every other issue. Yet even if we could somehow, wave a wand at this very moment and assure population stabilization around the world, with numbers of births equalling numbers of deaths and in migration equalling out migration, all these other problems would persist and would continue to pose threats to the societies and governments of every nation.

What are these other problems? Let's look quickly at just a few. There is the global loss of forest cover, especially the depletion of the tropical rain forests. This loss, of course, is by no means unrelated to human population growth, because the greatest single source of pressure on the world's forests is expanding human settlements and human activities, from commercial logging and collection of fuel wood to individual slash-and-burn clearing for subsistence agriculture. The results are reduced forest product resources, soil erosion, increased siltation of rivers and lakes, and even accelerated atmoshperic and climate change, since the forests are the great "lungs" of the earth, absorbing large quantities of CO_2 build-up in the atmosphere but to many other problems.

The experts tell us that the tropical moist forests are now disappearing at a rate of two per cent per year, much faster than that in West Africa and Southeast Asia where most of the tropical rain forests are likely to be gone by the end of this century. The noted biologist Peter Raven suggests an even more graphic measurement of what is happening around the world. He says that "about 35 acres of tropical rain forest is being logged per minute" at the present time.

Even temperate zone forests are under threat, not from unsustainable demands pressures or failure to institute sound replanting programs but from various forms of air pollution and acid precipitation. This damage is perhaps most evident in the great forests of Europe -- in West Germany, Czechoslovakia, and Poland -- but evidence of mounting loss in the eastern United States and Canada is also clear. Perhaps many of you noted the report from the World Resources Institute earlier this year regarding the impact of acid deposition on the forests and lakes even of the Pacific Northwest and the Rockies.

Next is extinction of species, which is occurring at an unprecedented rate mainly through the destruction of habitat in forest areas in the face of growing human pressures. A priceless global pool of genetic resources is disappearing, often before we have a chance even to identify or catalogue the species. One estimate is that we are losing some 1,000 plant and animal species per year; others would place the figure much higher. The fact of the matter is that we really don't know how much of the earth's genetic wealth we are squandering. This is what Professor Edmund Wilson of Harvard University has called "the folly that future generations will least forgive us."

The tropical rain forests are home to much of this incredible richness of life. Some say there are at least three million species of plants, animals and micro-organisms in the tropics, but other researchers feel that that number may be too low by a factor of 10.

And the issue is not solely one of aesthetics or morality, although I believe each of those perspectives is valid. The United States is in constant scientific and commercial need of the reinvigoration of wild species for the health of principal agricultural crops, as well as for industry, medicine, and other purposes.

Let's turn to the depletion of croplands, through desertification, salination, erosion, and conversion to non-farm uses. The United Nations tells us that roughly 50 million acres of croplands per year are becoming unproductive at present. We all know, of course, that both erosion and formation of topsoil is a natural process. And, for millennia, humankind has lived comfortably within the margin afforded at the balance between the two. But rapid growth in human numbers and escalation in world demand has led us to destroy that natural balance in many areas, so that soil erosion is now estimated to exceed new soil formation on 35 per cent of the world's established croplands. This trend is most evident in Africa, where 40 per cent of the people live in countries in which the productivity of the land has actually declined from its level of a generation ago.

Grasslands are also disappearing at a rapid rate, especially in Africa, the Middle East, the Asian subcontinent, and Central America. The loss of natural pasturage for animal herds is driving many people off the land and into a state of chronic dependency.

What about global atmospheric and climate change? About the best we can say here is that we are engaged in a vast global experiment over which we have little or no control and only the most rudimentary understanding of what the effects will be if our experiment follows the course of the worst-case assumptions. There are few issues about which there is such a wide range of theory and conjecture and a paucity of hard data. We do see clear indications that we are pumping carbon dioxide into the atmosphere at an accelerated pace, which would lead to a gradual rise in the world's temperature and, potentially, to much wider swings in climatic patterns at the local level. It's easy to recognize the catastrophic impact of a few degrees of warming of the earth's temperature, enough to start a melting of the polar ice caps and glacial areas with a consequent rise in sea levels. The difference of a few feet in many coastal regions of the world could wreak havoc with port cities, shipping facilities, homes, businesses, recreational complexes, tourism.

But, curiously enough, it may be that the political effects of stronger climate irregularites and changes may be of even greater importance. Several years ago, Walter Orr Roberts at the National Center for Atmospheric Research in Boulder advanced the thesis that a global warming might lead to a "flip-flop" in the comparative positions of the United States and the Soviet Union in regard to agricultural productivity. The great breadbasket of the American Midwest might become more arid and inhospitable to farming and the vast but now marginal croplands of Russia might flower with longer growing seasons and heavier rainfall.

The threat to the ozone layer, the stratospheric "umbrella" that shields the earth from the worst effects of the sun's rays, has been much in the press lately, and in particular the sudden recognition of what appears to be a huge and unexplained "hole" in the ozone layer over the Antarctic. The ozone problem was considered fanciful or alarmist by many a decade ago, but at least the United States chose the prudent course of minimizing the danger by banning aerosol sprays to reduce the amount of chlorofluorocarbons being released into the atmosphere. But, our industrial allies did not follow suit and we took no steps to cut back on the widespread use of chlorofluorocarbons in refrigerants and electrical insulators.

Now the Antarctic phenomenon seems to be a warning that some of the worst fears expressed a decade ago may be realized far earlier than anticipated. No doubt many of you have seen the excellent article in the June 9, 1986, issue of the New Yorker, well written for the lay reader. A strange source to cite? Well, let's remember that it was the New Yorker that first published John Hersey's Hiroshima and Rachel Carson's Silent Spring. It's well worth a look if you have not seen it. The story is fascinating.

The British scientists measuring ozone levels in the Antarctic had literally sent back to the U.K. for new equipment because they felt they could not trust the readings they were obtaining. It was only after they corroborated their findings with further measurements there and at other research stations in the Argentine Islands that NASA, relying on heretofore ignored data generated by the NIMBUS-7 satellite, reconfirmed the conclusions of their British counterparts and even were able to produce a detailed map of the enormous hole that had appeared in October 1983 over Antarctica. And why had the NASA data been ignored? Because the NASA computers were programmed to reject findings at the very high or low ends of the scale, on the grounds that indications of such severe ozone loss had never before been observed. How little we know, with all of our technical expertise, and how much we have to learn.

What actually is happening to the ozone layer over the Antarctic? No one can yet be sure and here are many conflicting interpretations. But we do know that something highly unusual and potentially ominous is taking place, and that stratospheric change may be occurring even faster than the so-called pessimists of the 1970s had warned.

There isn't time to go into every one of these global issues, of course, and we haven't even mentioned toxic wastes and the environmental effects of the release of other persistent chemical poisons and pesticides into the environment. We know that story well in the United States through the headline stories on Love Canal, Times Beach, and Superfund. We are gradually understanding that it really is like the commercial on television: "You can pay me now . . . or later." And if you choose to pay later the bill is likely to be steep. A few years ago, Hazel Henderson described this problem well by saying that we are running out of "aways" to throw things. The kinds of disposal practices that were at least tolerable, even if not ideal, when we had fewer people and were imposing less strain on our natural systems are no longer acceptable.

Take fisheries a matter of some concern to people in the United States, but one of critical importance in many countries of the world that are heavily dependent on fish catches for the daily diet of their populations. There are some 32 countries, especially in the Third World, in which people derive one-third or more of their animal protein from the sea. From 1950-1970, it looked as if we were riding a skyrocket of fishery production, with the annual worldwide catch increasing at an average of 5 per cent per year. But after 1970 there was an abrupt change; even allowing for some fluctuation, growth in the world's fish catch has fallen to a rate of one per cent a year. Most experts attribute this to overfishing and a failure to allow for the natural replenishment of fish stocks.

We haven't even mentioned energy, a central issue in very society of the world, passed its peak of oil production in 1970 and, despite some very major efforts in exploration and new drilling since then, we appear to be on a long, slow decline. It may be that the Soviet Union reached its peak of oil production in 1983, it's still too early to tell. But we do know that the figures for 1984 showed no advance, and that in 1985 the Soviet Union registered its first absolute decline in oil production since the Second World War.

If 1983 was, indeed, the Soviet peak in oil production, this would not be surprising, as it would logically occur soon in any case. The world's peak of liquid fossil fuel extraction is likely to come sometime around the turn of the century, perhaps earlier, perhaps later. As a recent Worldwatch paper put it, when the time comes in 2059 to celebrate the bicentennial of Colonel Drake's first oil well in Pennsylvania in 1859, which launched the whole adventure, little of the world's petroleum will remain. In just 200 years, we will have exhausted this major geological resource. And, in fact, the real "glory days" of cheap oil will have passed within the lifetimes of people in this room.

In my remarks I have attempted to demonstrate the global nature of environmental problems, a series of grave challenges which can only be addressed effectively by a global citizenship on the part of the world's people. The arousal of these people through information and awareness is the task of the environmental educator. Few professions or professional organizations can claim a role more central to the world's future than environmental educators and NAEE. I salute your efforts and pledge the cooperation of my organization in this important work.

Preconference Workshop Report

Environmental Education: An Assessment of the Last Decade
NAEE Sections Workshop Report

Jerry Berberet
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Williamette University, Salem

This report is a compliation of the findings and recommendations of the individual NAEE sections, as contributed by Section authors, Alan Schwartz and John Miles of the Environmental Studies Section, Paul Hart of the Elementary and Secondary Education Section, and Lori Mann of the Non-Formal Section.

The three NAEE sections -- Environmental Studies, Elementary and Secondary Education, and Non-Formal -- joined forces in offering a Preconference Workshop for more than 100 participants, September 12-14, 1986. Participants assessed the current state of environmental education in the United States and Canada in light of the goals and recommendations of the 1977 Tbilisi Intergovernmental Conference on Environmental Education. In their deliberations participants were aided by the 125 responses to a survey conducted just prior to the Workshop as a self-assessment of program strengths, weaknesses, and goals for the future. As many of the respondents were unable to attend, the survey expanded the range of views considered beyond the experiences of the Workshop participants themselves.

A major goal of the Workshop was to develop some sort of organized EE program assessment of the North American experience since 1977 for the "Tbilisi plus 10" Congress on Environmental Education and Training cosponsored by the United Nations Educational, Scientific, and Cultural Organization (Unesco), the United Nations Environment Programme (UNEP) and the Government of the Soviet Union, held in Moscow, August 17-21, 1987. As such the Workshop extended the self-examination process begun in 1984, when the NAEE sections collaborated on a workshop entitled, "Environmental Education for the Biosphere: A Workshop on Ecologically Sustainable Development," to kick off NAEE's 1984 annual Conference held at Lake Louisa, Alberta. A major outcome of the 1984 workshop was the impetus it generated for the development of a global strategy for environmental education, a motive ultimately expressed in the decision to convene the 1987 Moscow Congress.

William B. Stapp, participant in the 1977 Tbilisi Conference and former President of NAEE, delivered keynote remarks at the Eugene workshop. He reviewed Tbilisi's findings and recommendations, highlighting Tbilisi's call for promoting a systems approach to environmental education and incorporating legitimate economic development concerns while emphasizing educational efforts in the full range of formal and non-formal programs. Tbilisi urged the development of national EE strategies and a variety of activities to foster international and regional cooperation. Tbilisi assigned major responsibilities to Unesco and UNEP in implementing international activities and coordinating the work of United

Nations agencies. After listing the remarkable number and variety of EE conferences and workshops which have been held worldwide since 1977, Stapp closed with observations placing the aims and accomplishments of such international gatherings in perspective: "An international environmental education conference cannot accomplish very much environmental education in and of itself. Its role is to define problems, to suggest approaches to resolving these problems and most especially, to focus the attention of governments on environmental education as one effective tool in their efforts to wisely develop the Earth's resources and enhance the quality of life while safeguarding the ecosystems upon which all life ultimately depends."

The general goals for environmental education adopted at Tbilisi reflect the influence of North American views stressing holistic, interdisciplinary, and problem-focused approaches to EE within a world view emphasizing ecological interdependence and the need for changes in human values and behavior:

a. to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas;
b. to provide every person with opportunities to acquire the knowledge, values, attitudes, commitments, and skills needed to protect and improve the environment;
c. to create new patterns of behavior of individuals, groups, and society as a whole towards the environment.

Due to the compatibility of the Tbilisi recommendations with American perspectives, the outlook for their implementation seemed bright in the United States. Not only had schools at all levels established EE programs by the mid-seventies, but the environmental movement enjoyed widespread popularity and political clout that had led to creation of the Federal Office of Environmental Education in 1970.

Indeed, this favorable climate in the United States boded well for follow-up activities on behalf of Tbilisi during the immediate aftermath of the Conference. The 1978 National Leadership Conference on Environmental Education in Washington, D.C., outlined a United States EE Strategy which included recommendations for establishment of a National Center for EE and state level EE offices. These actions would assure planning and coordination at the national and state levels in support of a U.S. strategy to implement Tbilisi. Unfortunately, the changing political and economic environment in the United States failed to sustain these intitiatives; even the U.S. Office of Environmental Education was closed at the beginning of the 1980's when its enabling legislation was not renewed.

Lacking a structure for systematic implementation, coordinated action on the Tbilisi recommendations quickly languished. School and citizen EE organizations found it difficult to keep the spirit of Tbilisi alive as national priorities shifted to embrace economic recovery, energy independence, and national defense concerns. In an atmosphere in which program survival was at stake for many environmental educators, Tbilisi became a distant memory, revived only in recent years as the American EE community has begun to respond to calls for a renewal of international EE initiatives. As a consequence, many Eugene Workshop participants were only minimally acquainted with the Tbilisi Conference prior to Stapp's keynote remarks.

The Workshop format included both individual NAEE section deliberations and sessions of the workshop as a whole. Section conclusions and recommendations provide insight to the current state of EE in North America.

The Environmental Studies Section (ESS) acknowledged that there are many fewer higher education programs now than a decade ago and fewer students enrolled in Environmental Studies courses, but contended that a number of programs with clear administrative support, a balanced interdisciplinary curriculum, and diverse approaches to learning have prospered and enjoy strong student followings. The ESS group noted the overall professional career success of program graduates and the degree to which environmental analysis has come to pervade inquiry in other academic fields and political decision making. Yet, all agreed that as an emerging discipline environmental studies has considerable distance to go before it achieves full acceptance in the fold of established academic disciplines.

The Elementary and Secondary Education Section (ESES) noted the success of outdoor and nature-focused school programs, but lamented the absence of treatment of a societal context in program content. On the whole, school programs assume a scientific viewpoint with little emphasis on local to global environmental issues and socio-historical perspectives. A major challenge for the future is the development of critical thinking skills which can occur through participatory investigation of actual environmental problems. ESES participants recommended that the Moscow Congress focus on teacher preparation programs to strengthen future teachers' knowledge of child development and learning capacities, understanding of concrete issues and skills to be taught, ability to use applied pedagogical techniques, skill in treating values in the classroom, and ability to employ evaluation measures for programs and students.

Non-Formal Section (NFS) participants and survey responses noted that their programs basically serve elementary school groups with on site programs, despite the claim that adults and families are primary audiences. Overwhelmingly, NFS programs emphasize the natural environment, little content being devoted to resource use decisions or outcomes of environmental problems caused by human actions. A serious problem for NFS professionals is the high degree of career change which occurs due to "burnout" associated with low pay and heavy work loads. NFS workshop participants express a future need to reach broader bases, currently their most pressing problem, and to gain greater public acceptance as legitimate educators in order to increase effectiveness.

According to Environmental Studies Section participants, as reported by Alan Schwartz and John Miles, the following qualities characterize Environemtnal Studies programs which have prospered in the higher education setting during the past decade:

1. A specific responsibility for the program exists within the organization of the college or university. A dean or director with clear authority and a line to the institution's central administration is present.
2. Strong programs display a dedication to, and mechanisms for, achievement of interdisciplinarity in the Environmental Studies curriculum.
3. The Environmental Studies curriculum has sufficient flexibility so that the learning process can be tailored to the needs and asperations of students. Learners play a meaningful role in planning their learning.
4. A reward system that encourages the faculty to teach Environmental Studies is present. (Where peer review emphasizes primarily disciplinary achievement, the motivation for effective contribution to ES is low, and programs have trouble.)
5. Strong programs enjoy a relatively high degree of curricular autonomy within their institutional context.
6. Successful ES programs are organized to bring faculty from varying disciplinary backgrounds together in ways which encourage prolonged, consistent, and deep interaction.
7. In regard to number 6 above, faculty in strong programs are drawn from the entire discipline spectrum, from the natural and social sciences as well as from the humanities.
8. Strong programs in EE or ES, as in higher education generally, involve diverse approaches to learning. Experiential approaches to learning as a complement to more conventional classroom work are common. Internships, "hands-on" research opportunities, and individually designed projects are common in strong programs.

Both the Elementary and Secondary Education Section, as reported by Paul Hart, and the Non-Formal Section, as reported by Lori Mann, developed clear and specific recommendatins for stregthening programs in the future. Those proposed by ESES include the following:

1. Because of various societal factors, including technological developments, EE has begun to evolve from a focus on biological and physical aspects of environment to broad concerns with social and physical components. Individual programs can profit from information exchange and greater awareness of global goals and principles for environmental education.
2. Future program initiatives could benefit from increased development of problem-solving and critical thinking skills through issue investigation of real-life, community-based problems where students function as researchers.
3. Achievement of critical thinking through participatory investigation and issue resolution by students may require a parallel prerequisite in terms of teaching behavior -- that is, participatory, collective investigation into pedagogical issues (e.g., instructional techniques) where teachers function as researchers.
4. Many of the characteristics of EE programs described in the Tbilisi Declaration can be understood only by teachers who have experienced them.
5. No need was expressed for more or better EE materials. Thus, a future direction for EE might be a shift from

evaluation of the implementation of curriculum materials to creating conditions for practitioners to engage in collective, participatory self-evaluation of personal/professional theories, practices, and contexts (similar to this workshop process).

6. Participants came to a greater understanding of some of the key issues of EE through reflection about concrete programs. This is a form of evaluation which could develop more formal data collecting procedures but remain participatory and nonthreatening.
7. The Tbilisi + 10 Congress should focus on teacher preparation programs, with emphasis on the following tasks: re-examine the rationale for EE, encompass what is known about child growth and development, develop a more concrete K-12 framework, redefine the acceptable roles of teachers, re-examine the interdisciplinary goal in terms of practical applications, clarify and define more precisely those skills involved in issue resolution, help teachers deal with values in classrooms, and employ a broad, evaluation measures for programs and for students.

The Non-Formal Section identified both what needs to be done to improve programs and constraints which must be overcome to fulfill the needs:

What Needs to be Done in Non-formal EE

1. Non-formal programs need to reach out to a wider variety of target audiences. We are currently most effective with elementary age school children, a relatively captive audience. Non-formal programs should attract younger and older children, families, adults, decision-makers, etc., as frequently as they do elementary school classes.
2. As non-formal educators, we need to expand our own knowledge of HOW to reach non-traditional target audiences. This training is not provided in current college training programs.
3. We need to expand our efforts to include the "total environment and its associated problems" in our programs.
4. We need to stabilize and increase our funding. It is difficult to progress when the ground is always shaking.
5. We need to update our Board policies and statements of purpose to reflect the goals of the Tbilisi Conference. This renders our efforts more legitimate and provides a firm base from which to operate when trying new, farther reaching programs.
6. We need to improve the professional status of our staffs and move away from the traditional reliance on volunteers and interns. Both of these groups provide invaluable service, but to accomplish the goals of Tbilisi, we need to hire trained individuals with the skills necessary to impart the knowledge and attract the audiences.

Constraints to Progress in Non-formal EE

1. Overwhelmingly, the greatest constraint facing non-formal EE efforts is the lack of adequate and appropriate funding. Our programs are dependent on the status of the economy and the whims of decision-makers.
2. Staff training and facilities are often inadequate, again

due to lack of sufficient funding.
3. Environmental education recieves little or no support on the federal level.
4. There is little outside recogniton of the importance of the work we do; in the public eye, we lack validity as true educational facilities and organizations.
5. We always need to incorporate an entertainment value in order to attract and/or captivate our audiences. It is difficult to educate on serious issues when the value of having that information is not inherent to the general public.
6. Universities are not training EE students to reach non-traditional audiences. We graduate students prepared to deal primarily with white, middle class, elementary school students.
7. "Burnout" -- from overwork and underpay -- leads to a lack or loss of professional leadership in the non-formal arena. There is not enough continuity and quality of leadership in the field; too many highly competent professionals leave EE for better paying positions in unrelated fields.

Although this review of the status of environmental education in the United States is highly impressionistic, several observations seem pertinent to future EE efforts. EE clearly needs to take steps to enter the educational mainstream more directly than is the case presently. One approach is to exploit the considerable similarity between EE goals and those of the general education reform movement at all levels of education during the past decade. EE's emphasis upon holistic perspectives, effective communication, and ethical imperatives is consistent with the critical thinking, clear communication, values inquiry, integrative analysis, and societal applications being stressed in general education programs.

Becoming part of the current national movement to reform teacher preparation would seem essential to the goal of moving EE more to the center stage of all education. The training of all teachers should include exposure to an ecological world view, experience in applied problem-solving, and a grounding in ethical reasoning which includes environmental values. Many environmental educators believe that teachers must be trained more rigorously in the inquiry skills of research and analysis, as well as the pedagogical methods of the teaching process. Future environmental educators will need to possess multi-disciplinary environmental knowledge and be able to analyze the human cultural dimensions of environmental problems as well as the revelant data from the natural sciences. Teachers will need to be able to model in their own capabilities the educational qualities they hope to instill in their students.

There is room for at least cautious optimism regarding the future. Although environmentalism no longer has the political clout it once had in the United States, public opinion polls consistently indicate that environmental concerns rank high. The aims of NAEE today closely parallel the vision for EE articulated at Tbilisi in 1977, and NAEE has doubled its membership in the past five years. Prospects seem that the movement for sustainable development will ease the traditional adversarial relationship between environmental and economic interests. The emerging era of electronic technologies, with their potential to utilize resources and energy more efficiently while generating less waste than their smokestack industrial era counterparts, may signal the coming of a more benign technological impact on the environment. And, finally, the Moscow Congress may represent the dawn of a new age of international cooperation on behalf of the biosphere and the evolution of new and more effective educational and training strategies.

EE Curriculum and Instruction

ASSESSING ENVIRONMENTAL EDUCATION CURRICULA: THE ENVIRONMENTAL EDUCATION CURRICULUM INVENTORY, FORMS A & B

Ron Gardella
Northern Kentucky University

While the emphasis on evaluation and research in Environmental Education is encouraging, further attemps to examine the various aspects of environmental education are needed (Linke, 1985). Volk, Hungerford, and Tomera (1983) have noted the need for research that addresses environmental education curriculum. They have particularly noted the need to examine the disparity between current environmental education curriculum and the stated goals of environmental education in order to bring theory into practice in the development of "goal focused" curriculum. The Environmental Education Curriculum Inventory is an attempt to respond to this need. It is an attempt to provide a practical environmental education curriculum evaluation system for practicioners that assess curriculum materials in terms of the goals of environmental educaion in an efficient, workable format.

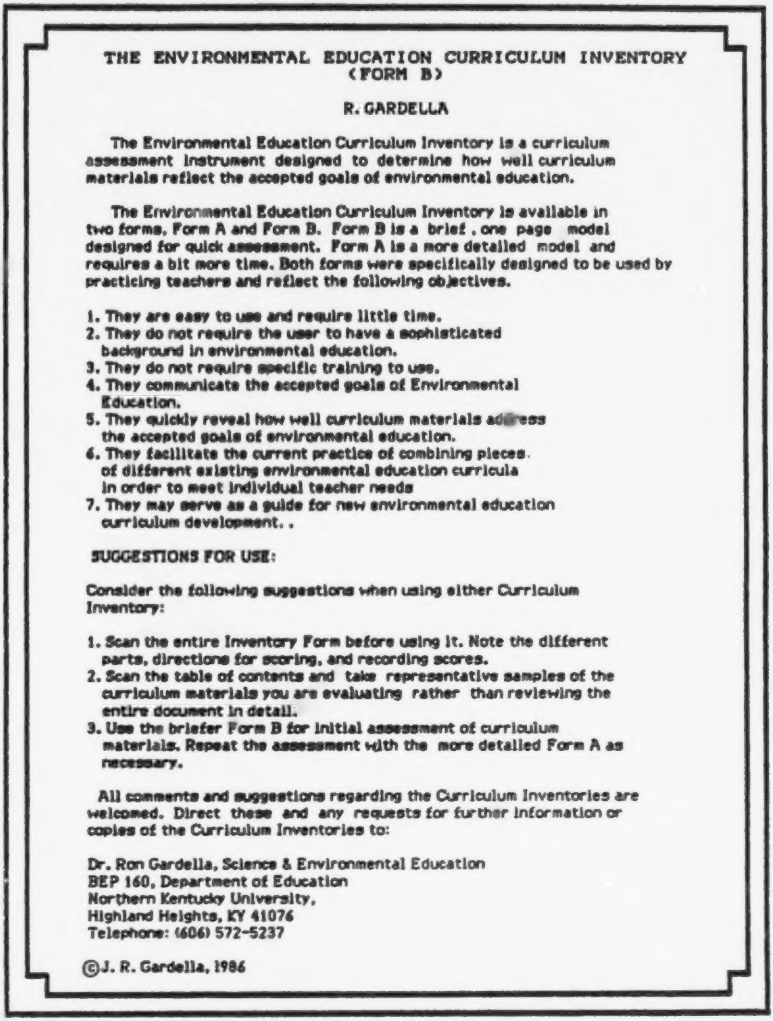
The Environmental Education Curriculum Inventory includes two forms, Form A and B. Form A (Gardella, 1985) is a somewhat detailed model while Form B is a briefer, one-page version. Form B of the Curriculum Inventory is a synthesis of Form A (not shown) and is presented in Figures I and II. Both forms compress the accepted goals of environmental education and portray them in a check-list form. This format facilitates evaluating the curriculum materials in terms of the degree to which they emphasize the goals. Both instruments include a bar graph as a data summary device that simplifies the process of identifying the emphasis of the evaluated curricular materials.

Development of the environmental curriculum inventory began in the summer of 1984 in response to a number of factors, including the following:

1. Researchers report a disparity between the accepted goals of Environmental Education and current Environmental Education curriculum development (Linke, 1984; Stephensen, 1984; Hungerford, Tomera & Volk, 1983) and the need to bring these goals "to the classroom" in terms of goal focused curriculum (Hungerford & Volk, 1983).
2. The current status of environmental curriculum materials support the above contentions. Disinger (1979) and Childress (1978) note that environmental education curricula are characterized by the following:
    a. Approximately 87% of EE curriculum materials are developed locally by practicing teachers, are "homemade", indicating frequent borrowing from existing curriculum materials and modifying the published activities in favor of local goals.
    b. The focus of the locally developed curriculum materials are reported as interdisciplinary, but favor Biology and Ecology.

   c. The curriculum materials reportedly address environmental awareness and knowledge, but neglect investigation of issues or environmental action.

3. Teachers report lack of time, guidance, and available instruments in developing EE curricula as major constraints in EE program development (Champeau, Gross & Wilke, 1980; Passineau, 1976).



THE ENVIRONMENTAL EDUCATION CURRICULUM INVENTORY
(FORM B)

R. GARDELLA

The Environmental Education Curriculum Inventory is a curriculum assessment instrument designed to determine how well curriculum materials reflect the accepted goals of environmental education.

The Environmental Education Curriculum Inventory is available in two forms, Form A and Form B. Form B is a brief, one page model designed for quick assessment. Form A is a more detailed model and requires a bit more time. Both forms were specifically designed to be used by practicing teachers and reflect the following objectives.

1. They are easy to use and require little time.
2. They do not require the user to have a sophisticated background in environmental education.
3. They do not require specific training to use.
4. They communicate the accepted goals of Environmental Education.
5. They quickly reveal how well curriculum materials address the accepted goals of environmental education.
6. They facilitate the current practice of combining pieces of different existing environmental education curricula in order to meet individual teacher needs
7. They may serve as a guide for new environmental education curriculum development..

SUGGESTIONS FOR USE:

Consider the following suggestions when using either Curriculum Inventory:

1. Scan the entire Inventory Form before using it. Note the different parts, directions for scoring, and recording scores.
2. Scan the table of contents and take representative samples of the curriculum materials you are evaluating rather than reviewing the entire document in detail.
3. Use the briefer Form B for initial assessment of curriculum materials. Repeat the assessment with the more detailed Form A as necessary.

All comments and suggestions regarding the Curriculum Inventories are welcomed. Direct these and any requests for further information or copies of the Curriculum Inventories to:

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Northern Kentucky University,
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Figure I

ENVIRONMENTAL EDUCATION CURRICULUM INVENTORY - (FORM B)

Figure II

HOW WELL WOULD THE MATERIALS CAUSE STUDENT USERS TO :

I. Know facts, concepts, principles of ECOLOGY such as:

a. All living things , including man, affect each other (e.g. predator-prey, food chain, food web, competition, population behavior and distribution.)

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

b. Living things affect their non-living surroundings, and are in turn affected by these changes. (e.g. water, mineral, pollutant cycles, pollution, distruction of animal habitat, plant succession, etc.)

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

c. Non-living things determine the kind of environment and in turn the variety and number of plants and animals. (e.g. types of environments - desert, forest, pond, etc. , animal and plant adaptation).

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

II .KNOW ABOUT and INVESTIGATE ENVIRONMENTAL PROBLEMS:

a. Know that people use the environment differently and often cause problems because of their values and attitudes.

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

b. Explore case studies that identify environmental problems, causes, and resultant effects.

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

c. Allow students to explore environmental problems, identify costs , and suggest solutions.

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

III. KNOW ABOUT AND PRACTICE ENVIRONMENTAL ACTION.

a. Define responsible environmental action, types, categories, and/or examples.

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

b. Describes / presents models of responsible environmental action with a variety of action case studies.

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

c. Allow students to suggest and/or take environmental action.

Not at all 0	Yes,but poorly 1	Yes, fairly well 2	Yes,very well 3

IV. Do the materials reflect recommended TEACHING METHODS and PERSPECTIVES such as:

a. Using 'hands-on', direct experience teaching methods.

No	Yes

b. Being on the appropriate educational level for student users.

No	Yes

c. Being current and accurate

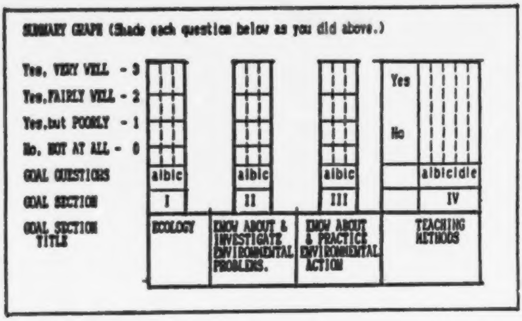
No	Yes

d. Adequately evaluating the stated lesson or program objectives.

No	Yes

f. Having adequate directions and thus easy to use.

No	Yes


SUMMARY GRAPH (Shade each question below as you did above.)
Yes, VERY WELL - 3
Yes, FAIRLY WELL - 2
Yes, but POORLY - 1
No, NOT AT ALL - 0
GOAL QUESTIONS
GOAL SECTION
GOAL SECTION TITLE
a|b|c
a|b|c
a|b|c
a|b|c|d|e
I
II
III
IV
Yes
No
ECOLOGY
KNOW ABOUT & INVESTIGATE ENVIRONMENTAL PROBLEMS.
KNOW ABOUT & PRACTICE ENVIRONMENTAL ACTION
TEACHING METHODS

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Given the foregoing conditions, the author reasoned that if one could develop an evaluation instrument that used and communicated the goals of EE, that practicing teachers could use without needing a sophisticated background in EE, that required little time and quickly and clearly revealed the focus of evaluated curriculum materials, it might then support (a) the "goal focused" curriculum that is needed, and/or (b) support curriculum development that addressed all of the goal areas instead of just awareness and ecological knowledge.

Objectives that accommodate the factors noted above are listed on both Inventory forms and teacher users were asked to assess the degree to which the instruments met the stated objectives. A survey of teachers who have used Form A of the Inventory indicate it is meeting all of the objectives. They further noted that it did provide a detailed view of the evaluated curriculum materials, but was too long and time consuming for their purposes. They felt that a briefer form would better serve their needs. They further noted that some of the terms were too technical and could be simplified. These recommendations were implemented in the development of Form B.

Teacher users of Form B of the Environmental Education Curriculum Inventory report it as meeting the goals, was not too time consuming, understandable, and something that they would use when involved in curriculum development.

Research on the use of the Curriculum Inventory continues. The environmental education community is encouraged to use both Forms A and B and share data experiences, and suggestions with the developer. Through this process it is hoped that the desired comprehensive, goal sensitive curriculum may develop and that environmental education will ultimately profit.

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CHILDREN AND WILDLIFE:
RESEARCH IMPLICATIONS FOR SUCCESSFUL INFORMATION TRANSFER

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Information transfer is more readily achieved when the presentation is engaging and geared to the development stage of the student. Schools, however, are not perceived by elementary and secondary students as successful communicators of environmental information. Greater use of nonconventional educational materials and application of development theory would enhance the successful transfer of environmental information.

This paper discusses children's acquisition of knowledge about wildlife and the natural environment and their attitudes toward wildlife and conservation issues in relation to stages of cognitive and moral development. The implications of research findings for environmental educators are presented and methods for successful information transfer are discussed.

Cognitive Development

Learning about children's cognitive development and applying that information to children's acquisition of knowledge about wildlife and the natural environment is the first step to developing a systematic and successful approach to wildlife education. This is not a new idea. Dewey advocated it in 1938. Lawton and Hooper (1978) pointed out the educational implications of structuring the child's acquisition of knowledge about the environment by indicating that: "1. the development of curricula must take into account the invariant sequence of cognitive development; and 2. tasks should take into account the child's readiness for, and interest in, learning."

Jean Piaget has probably had more influence on developmental theory and educational practices than any living psychologist (Ripple et al. 1982). In his theory of cognitive development, Piaget identifies two basic human tendencies: organization (the ability to systematize and combine processes into coherent systems) and adaptation (the ability to adjust to the environment). Piaget believes that children attempt to bring coherence and stability to their concept of the world and to understand inconsistencies in experience. As children incorporate and modify their conceptions of objects and experiences they establish organized patterns of behavior and thought. The ability to think in terms of abstract hypotheses (formal operations) develops only after a child has gone through a series of cognitive stages from infancy to adolescence. The four basic development stages outlined by Piaget are summarized in Table 1.

The importance of presenting Piaget's theory of cognitive development is so research on children's knowledge of wildlife and their attitudes toward animals and resource issues can be examined in relation to children's developmental stages. By understanding the basic stage of a child's development, it should be easier to interpret how concepts about wildlife and the natural environment are incorporated at a given age. Designing successful materials and methods to increase the incorporation of that knowledge depends on this understanding.

Application of Cognitive Theory to Environmental Knowledge

Piaget's theory of cognitive development was used by Rejeski (1982) to understand the development of children's perception of the environment. Based on an analysis of children's drawings of "nature," Rejeski outlined three stages of cognitive development in the acquisition of environmental knowledge and understanding of ecological concepts. In the first stage, *Literalism*, (ages 6-7), the child was interested in his immediate environment and had little ability to see himself removed from his physical surroundings. During the second stage, *Organization*, (ages 9-10), children classified and systematically reduced the complexity of the world through natural laws. Nature was seen as an enclosed space, i.e., a pond, forest, or mountain, and children became aware that human intervention may produce deleterious effects on the environment. This is the stage that begins to provide a basis for the land ethic. At age 13-14, the *Moralism* stage, children began to understand basic ecosystem concepts and explored the link between humans and their natural environment. A sense of moralism is established at this time.

ble 1. Piaget's stages of cognitive development[a]

Age	Developmental Stage	Abilities
0-2 years	Sensorimotor	. develop organized patterns of behavior and and thought (schemes) . primarily use sense and motor activities
2-7 years	Preoperational	. master symbols (i.e., words) . center attention on one characteristic at a time . cannot mentally reverse actions
7-11 years	Concrete Operational	. generalize from concrete experiences . unable to mentally manipulate unexperienced conditions
>11 years	Formal Operational	. able to form hypotheses . deal with abstractions . solve problems systematically . engage in mental manipulations

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[a] Adapted from Ripple et al. 1982.

The older children get the more they learn about ecosystem dynamics and the more they demonstrate an appreciation for

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wildlife at various trophic levels. Children's cognitive understanding about natural processes was demonstrated by Pomerantz's (1977) statewide study of over 2,000 seventh-twelfth graders in Michigan. The knowledge questions that the greatest percentage of students answered correctly dealt with the interdependence of biotic and abiotic elements of ecosystems (Table 2). When asked to describe why wildlife is important, the majority of children said because it is part of nature. Their knowledge was strongest on questions regarding ecosystem interdependence and their attitudes toward wildlife reflected that understanding.

It should also be noted that misunderstanding of specific ecological processes may be equally related to young people's attitudes toward wildlife resources. Knowledge questions that the lowest percentage of Michigan seventh-twelfth graders answered correctly related to the renewability of natural resources (Table 2). When these same children were asked to describe their attitudes toward hunting about 3/4 were opposed to sport hunting, while as many indicated that hunting for food was acceptable. To the individual who understands the concept of interdependence of living things, hunting as a means of providing nourishment may be quite acceptable. It represents the ultimate rung on the food pyramid. However, if the concept of wildlife renewability is not comprehended, hunting for reasons other than subsistence may be viewed as an action that depletes a resource and threatens the continued viability of a species. Indeed, in personal interviews of fifth graders in North Carolina, a number of students held the belief that if animals were hunted they would become extinct (Pomerantz, 1985).

Table 2. Percent of Michigan seventh-twelfth graders that correctly answered environmental science questions.[a]

Environmental Science Category	Percent of Correct Responses
INTERDEPENDENCE	
Air pollution's effect on plants	93
Insects' role in ecosystem	85
Interspecific competition	80
Wildlife habitat	78
Human effects on environment	66
RENEWABILITY	
Wildlife as a renewable resource	33
Forest fires	23
Energy transference	22
Forest succession	12

[a](Pomerantz 1977).

Moral Development

Just as different levels of knowledge acquisition can be linked to different stages of cognitive development, various types of attitudes toward the natural environment can be related to different stages of moral development. As a child goes through the stages of cognitive development, she likewise passes through a series of stages in the development of moral reasoning. Kohlberg and Gilligan (1971) point out it is Piaget's and their view that both moral stage development and cognitive stage development are types of thought and types of valuing that children use to establish organized patterns of behavior and stabilize their concepts of the world. The development of cognitive maturity is necessary before an individual can develop maturity in moral judgement (Table 3). However, cognitive maturity alone is not sufficient for an individual to reach the highest stages of moral reasoning.

Consequently, as a child progresses from the egocentric stage through the concrete to the formal operational, there should likewise be an evolution in attitudes toward animals and nature (Figure 1). Rejeski (1982) was able to define developmental stages in his analysis of children's perceptions of "nature," progressing from an egocentric vision of the natural world to an appreciation of the complexity of human effects on natural environments.

Table 3. Relations between Piaget's logical stages and Kohlberg's moral stages[a] (all relations are that attainment of the logical stages is necessary, but not sufficient, for attainment of the moral stage)

Logical stage	Moral stage
Symbiotic, intuitive thought	Stage 0: The good is what I want and like.
Concrete operations, Substage 1 Categorical classification	Stage 1: Punishment-obedience orientation.
Concrete operations, Substage 2 Reversible concrete thought	Stage 2: Instrumental hedonism and concrete reciprocity.
Formal operations, Substage 1 Relations involving the inverse of the reciprocal	Stage 3: Orientation to interpersonal relations of mutuality.
Formal operations, Substage 2	Stage 4: Maintenance of social order, fixed rules, and authority.
Formal operations, Substage 3	Stage 5A: Social contract, utilitarian law-making perspective
	Stage 5B: Higher law and conscience orientation.
	Stage 6: Universal ethical principle orientation.

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[a] Taken from Kohlberg and Gilligan 1971.

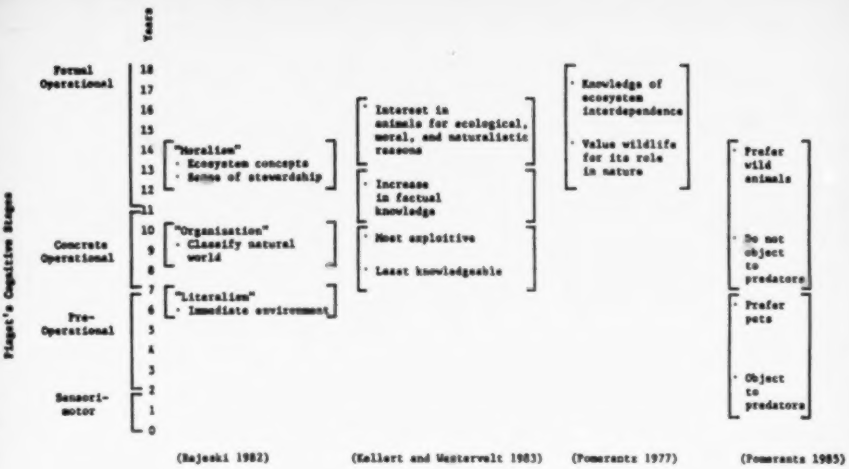
Piaget's Cognitive Stages
Years
Formal Operational
Concrete Operational
Pre-Operational
Sensori-motor
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
"Moralism"
· Ecosystem concepts
· Sense of stewardship
"Organization"
· Classify natural world
"Literalism"
· Immediate environment
· Interest in animals for ecological, moral, and naturalistic reasons
· Increase in factual knowledge
· Most exploitive
· Least knowledgeable
· Knowledge of ecosystem interdependence
· Value wildlife for its role in nature
· Prefer wild animals
· Do not object to predators
· Prefer pets
· Object to predators
(Rejeski 1982)
(Kellert and Westervelt 1983)
(Pomerantz 1977)
(Pomerantz 1985)

Figure 1. Comparison of children's perceptions of the natural world with cognitive stages of development.

Kellert and Westervelt (1983) documented a greater sensitivity to animals with older children. They studied the knowledge of and attitudes toward animals of 267 second-eleventh graders in Connecticut. Their findings corroborate Rejeski's stages of development. They found that young children, in grades two through five (7-10 years old), were the least informed about animals and the most exploitive. From grades five to eight (10-13 years old), there was a major increase in factual knowledge of animals. Children from grades eight to eleven (13-16 years) became more interested in animals for ecological, moral, and naturalistic reasons.

Children's preferences and appreciation for animals also change with age. In a national survey of children who subscribed to "Ranger Rick" magazine, Pomerantz (1985) found that children age 6 and under represented the greatest proportion who preferred stories about pets and objected to stories about predators. Preference for pets declined sharply, however, for both males and females age 7-14. Increasing numbers of older children, from 7-14, did not mind reading about animals preying on other animals.

Research Implications for Successful Information Transfer

Those of us concerned with developing a principled society relative to natural resource conservation should recognize that events during the childhood years have the greatest influence on adult attitudes (Hess and Torney 1967, Miller 1975, More 1977). We must realize, however, that the process of acquiring knowledge and forming attitudes about the natural world is an evolutionary one.

Once the developmental schemes used by children are acknowledged, the real challenge is to utilize that information in designing materials and methods for wildlife and environmental education. The classroom has not been the primary source of children's information about wildlife and the natural environment. The media--in the form of television and magazines--has been identified by children in the U.S., England, and Australia as a much more influential vehicle (Eyers 1975, Langenau and Mellon-Coyle 1977, Pomerantz, 1977, 1985, Richmond and Morgan 1977 inter alia).

In one study of materials used in elementary schools, the popular magazine style of "Ranger Rick" was compared with that of a standard science textbook. There was evidence that when information was presented in the magazine in a detailed colorful manner it had a greater impact on children's acquisition of information than a science text on the same topic (Pomerantz 1985). Studies of natural history television documentaries have also indicated positive effects on environmental knowledge (Fortner and Teates 1980).

The current curriculum guide with the most specific emphasis on wildlife education is Project WILD (Western Regional Environmental Education Council 1983). Project WILD makes use of the hands-on approach to learning advocated by educational specialists and gears its activities to the development stage of the child. Children in the elementary school years are forming their ideas as a result of concrete experiences. They need to experience an event directly to incorporate the lesson into their operational thought. Young children, in particular, benefit from a hands-on approach, and they have specifically indicated their desire to have increased opportunities for direct contact with animals and nature (Pomerantz 1977, 1985).

Educators would be wise to capitalize on this desire. Utilization of nonstandard information sources, such as magazines, curriculum guides (e.g., Porject WILD, Project Learning Tree, Class Project, etc.), and television would enhance classroom presentations. The research on children and wildlife has provided useful insights about the ways children acquire information and form attitudes about the natural world. It is now up to environmental educators to use this knowledge in the creation and utilization of innovative and workable materials to educate today's youth.

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ACTIONS SPEAK LOUDER THAN WORDS... OR DO THEY? ENVIRONMENTAL PROBLEM SOLVING IN THE CLASSROOM

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Environmental education is a process of creating a citizenry who can help resolve environmental issues. Efforts to achieve this goal have created curricula and programs that sensitize children to nature, raise awareness among older youth to environmental issues, build knowledge of ecological principles, clarify values about personal behaviors, and help people develop action taking skills. All of these efforts probably play a role in helping people become environmental problem solvers; research indicates that the elements that contribute to environmental problem solving are quite varied (Hines 1984, Hungerford et al. 1985, and Sia 1985-86). Research in cognitive psychology indicates that a familiarity with similar problems improves problem solving skills (Kaplan and Kaplan 1982, Posner 1973). Some of the elements important in solving environmental problems may be:

Knowledge of the environment and of issues
Familiarity with solutions to problems
Knowledge of action strategies that help resolve issues
Skill in action taking
Locus of control and empowerment
Attitudes and values
Sense of responsibility and committment
Group process skills
Communication skills
Problem solving skills

Classroom teachers have a host of available teaching strategies that may help students become environmental problem solvers: simulations, role plays, field trips, guest speakers, case studies, values activities, moral dilemmas, local issues, action projects, etc. One would assume, as Ramsey's research (1981) indicates, that an action project is the most effective teaching strategy for environmental problem solving, because practice solving local issues should help students become empowered and develop skills in group process and action taking. The limitation of exploring fewer major issues and the unknown degree of project success may, however, dampen the benefits of an action project.

Methodology

In March 1986, Michigan teachers who believe they help students develop environmental problem-solving skills were surveyed to determine which teaching strategies they use. The teachers volunteered to receive a survey during the Michigan Science Teachers Association or Michigan Environmental Education Association conferences held the month before. Some requested extra surveys to distribute among their colleagues. Consequently, 88 individuals were mailed 120 surveys, and 51 useable surveys were returned.

In addition to asking about their use of and success with 33 teaching strategies, the survey asked respondents 1) to describe the action projects in which their classes have been involved, 2) to rate the degree to which they found a variety of constraints to teaching environmental problem solving, 3) to indicate which environmental problem solving actions their former students have taken, and 4) background questions on: their years in teaching, the grades and subjects taught, conference attendance, organizational activity, degrees held, interest in the environment, perceived support from colleagues and administration, etc.

The dependent measure--the types of problem solving experiences former students undertook--was composed of eight examples, including low and high commitments to environmental action (e.g. "entered Peace Corps," and "took additional classes related to environmental problems,"). One would expect people to indicate more student actions than might have occured, but some respondents did not mark any of the examples.

That this measure may be unlikely to turn up any useful information between a teacher's poor memory, students who move away from their home town, and the variety of life experiences that contribute to forming a person's interests, is actually a strength. Given these constraints, all teachers could be equally successful. Finding any significant relationship between the teaching strategies and success should signal a strategy worth further consideration.

Results

The diversity of responses about former students' experiences, when considering only those teachers who taught junior high, high school, or college students for at least 7 years, enabled this question to categorize the respondents into low, medium, and high levels of "success." The eight variables were combined and the number of responses from each teacher used to divide the sample. Thus, the more successful teachers are those who had more students who showed an interest or participated in environmental problem-solving activities.

The most successful teachers used five teaching strategies significantly more often than less successful teachers. These five strategies are not a magic formula for success; the successful teachers also used other strategies. The other teaching strategies, however, were used equally often by less successful teachers. The chi-square statistic indicates there is a significant relationship between success and the following five teaching strategies:

To teach about solutions to environmental problems:
    "case studies" ($p <.04$)
    "trying to solve problems" ($p <.05$)
To teach about what students can do to help solve a problem:
    "case studies" ($p <.05$)

"talking about what others do" (p <.01)

To help students develop group process and interpersonal skills:

"becoming aware of others' beliefs" (p <.02)

A least squares linear regression analysis was used to determine which strategies were most helpful in predicting success. In teaching about possible solutions to environmental issues, over 46% of the variance can be explained by the use of one strategy: "case studies" (p <.03). Among the strategies used to teach students about what they can do to help solve a problem, two strategies predicted success for over 49% of the variance: "case studies" (p <.04) and "talking about what others do" (p <.06). In the other categories, the strategies were used equally frequently by successful and less successful teachers.

These data indicate there is more to teaching problem solving than action and experience. It appears that using examples of successful solutions to environmental problems and encouraging discussions of actual problem-solving experiences are critical ingredients for encouraging students to become problem solvers. By talking about how problems are solved and the hurdles that are met and overcome, students can increase their familiarity with problem-solving process. When they approach real problems, these students will have the broad experiences of the case studies to draw upon.

Ramsey's research (1981) came to the opposite conclusion, however, indicating that action projects are more effective in promoting student problem solving actions than case studies. It does not appear that he separated learning about actions from practicing action taking. When frustrated students in the case study class asked how they might help solve problems, he did not answer (Ramsey 1979). Only the action group received information about the types of actions that can be taken and had the opportunity to practice these actions.

Successful Action Projects

The open-ended question asking respondents to describe their action projects opened a window to understanding why these projects were not an important contribution to success. Of the projects described (n=28), most (n=18) involved field data collection, discussions or assemblies, or non-controversial ecomanagement projects (picking up litter or planting trees). Only 10 projects involved a potentially controversial issue where students surveyed citizens, wrote letters, reported results, or became involved in the decision making process. Of these 10 teachers, all were at least moderately successful.

Clearly, involving students in an action project can help students become environmental problem solvers. But a great variety of projects that are thought to be helpful may actually discourage some students from future environmental action. Action projects are challenging to engineer and do not guarantee a positive experience for all students. They entail a variety of constraints, as reported by a majority of the respondents: the inability to leave school, short class periods, lack of preparation time, lack of student knowledge and skill, and lack of materials to guide the process.

Action projects also require a very special commitment from the teachers. This survey indicates that teachers who use action projects have more graduate degrees, belong to more environmental and educational organizations, and perceive that they receive less support form their colleagues and administration. The teachers who were most successful, on the other hand, were different from less successful teachers only in that they were more interested in the environment.

Application to Curricula and Teaching

In summary, this research only restates what educators have known for a long time: students don't know more than we teach them, and teachers are more successful with strategies that are easier to implement. In the process of solving environmental problems, there are three categories of information to which students should be exposed: 1) background knowledge about the issue, 2) knowledge of the variety of ways environmental problems have been solved, and 3) specific information about the types of actions that have been used to resolve similar cases. Although participating in an action project can be an appropriate strategy to helping students understand this information, reading and discussing a wider variety of case studies and experiences seems to be more closely linked to succes, because it increases students' familiarity with environmental problem solving.

The Cousteau Almanac is an excellent source of success stories about people who helped solve environmental problems (they are called "wavemakers"). *Audubon* and *Sierra* magazines often feature issues, solutions, and heros; these can form the basis of case studies. In unusual places, one can find excellent "what to do if..." articles that can help students develop specific imagery of the types of concerns to which attention should be paid. Other sources are most certainly available, once we begin to look.

Further research should look carefully at the role case studies can play in helping students learn environmental problem solving skills--what length, what age, what topic, and how many are needed to make a significant impact? The dependent measure should test the students' knowledge and sense of efficacy directly, rather than relying on the teachers' impressions.

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FORM AND FUNCTION OF MICROCOMPUTER SOFTWARE FOR PRECOLLEGE ENVIRONMENTAL EDUCATION

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Microcomputers, with all their attendant trappings and vocabulary, have made their way into environmental education in classrooms, nature center, laboratories and offices. This paper presents a 1986 software availability report. For the past several years the author has been identifying and reviewing software programs that can be used for environmental education at precollege levels. These reviews have provided the basis for a Software Fair at the annual conference of the North American Association for Environmental Education in 1985 and '86. Each year's conference produced a comprehensive list of the software identified. The most recent list is available from the author.

Software for precollege environmental education is defined here as commercially available programs for personal computers, with a target audience of preschool through high school, and with subject matter related to the interdisciplinary scientific and/or social nature of our complex environment. The selection of such software was limited by available catalogs and personal contacts with software users. Omissions of important software programs or categories are unintentional and will be corrected upon notification.

Hardware Utilized by Environmental Education Programs

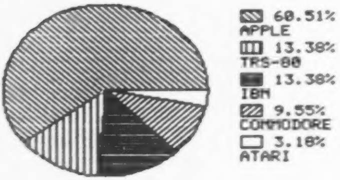
Of over 150 programs identified in the 1986 listing, 60.5% were designed for the Apple II family computers (II+, IIe, IIc). This is generally the same market share as in 1985 (60.9%). IBM software programs increased form 12.8% of the 1985 total to 13.4% of the 1986 listings (Figure 1). While this percentage is not staggering, it represents what may become a trend toward greater thrust in IBM toward educational programming. Another increase has been noted for TRS-80 programs, from 12.0% in 1985 to 13.4% in 1986. Both TRS-80 and Commodore (9.5% in 1986, down from 10.5%) have had advantages on initial entry into education because of low purchase prices for the hardware. TRS appears to be trying to maintain this initial edge by increasing software production. It may be, however, that memory size, enhanced graphic qualities and other desirable characteristics of high priced hardware such as IBM are enough to encourage educational institutions to undertake the greater financial burden of their costs rather than simply providing lower priced hardware in greater quantity.

Subject Matter of Environmental Education Software

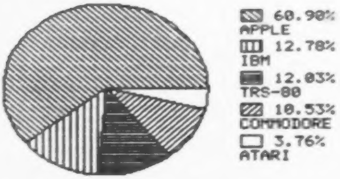
Because of the nature of environmental education, most of the subject matter represented in software is natural science. Even in catalogs devoted specifically to social studies, the social issues of the environment are rarely represented. Figure 2 shows a breakdown of subject matter, but it should be noted that some of the categories overlap. For instance, some

Figure 1. Microcomputers used for environmental education software

A. EE HARDWARE 1986

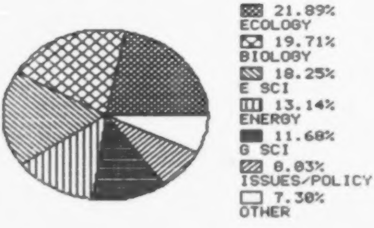


B. EE HARDWARE 1985



software in the Ecology category also could be classified as Biology, and the Energy category overlaps Earth Science in a few cases. In 1986, "trivia" tests became popular in software form, and the General Science category includes four such programs. The category "Other" include geography, management, history, and the scientific method, as well as a program entitled DIFFUSE, which relates to methods for disseminating information about community planning.

Figure 2. SUBJECTS OF 86 SOFTWARE



Functions of Environmental Education Software

A review of format of the environmental education software reveals that almost all programs can be classified into one of five categories. The first four are Computer Assisted Instruction (CAI), in that the computer is used to aid the delivery of instruction. A learner can interact directly with the computer without the intervention of a teacher. Such programs thus can allow self-pacing, varying levels of difficulty, and response reinforcement. Most can also be used wih teacher intervention as a type of instructional aid, much like a transparency or slide program.

Drill and practice programs allow students to practice what they already know and sharpen their recall skills. The computer asks a question, and the student responds. Advantages of this type of program are that the student responds. Advantages of this type of program are that the student can work at his/her own pace and receive immediate feedback on the appropriateness of responses. Applications in learning terminology or classification or doing computations are common among drill and practice programs. An example in environmental education is the "Earth Science Series" from Cambridge Development Laboratories, which reviews geology terms and includes practice in calculation of some standard earth science equations.

Tutorial programs are very common among EE software. In such programs the computer is the medium of instruction for new information. The computer provides some information then questions the student for mastery of it. Remedial sequences may be invoked until the student's responses are correct, then the program proceeds to further instruction. Often a summary test or application of information concludes the program. Examples of tutorials are "FOOD WEB" from DEE, Inc., and " BALANCE IN NATURE" from Focus Media.

While the concept of a tutorial is a sound one, this type of program is the most abused by amateurs intent on using computers. When the computer becomes nothing more than an electronic page-turner, as in much of the software from Educational Images, Ltd., the technology is not being appropriately or efficiently applied.

Simulations are a third level of application of computers in environmental education. Like simulations in any format, computer simulations allow learners to interact socially while solving problems and making decisions. Experimentation can be facilitated without drastic penalty, and abstract concepts can be introduced with a type of realism not possible in most other learning situations. In a simulation, the learner manipulates variables and measures the effects, thus becoming aware of cause and effect relationships.

An example of a simulation is "ECOSYSTEMS WITH ISLAND SURVIVORS", part of the Voyage of the Mimi package from CBS and Holt, Rinehart & Winston. Students are stranded on an island with four aquatic and four terrestrial organisms, which they choose. Choices must allow for each organism to be supported by the food chain and for the islanders to derive some food for themselves. Working to survive begins in spring and includes hunting for food, building shelter, and gathering wood. In the process, the other organisms are impacted and their population levels change. With each month's passing, the effect of human habitation becomes more apparent, but with good decision-making the islanders can survive the winter.

Simulations do have some disadvantages. They require greater programming skill, so they tend to be more expensive and less abundant. The models simulated tend to be oversimplified and users may not get a feeling for the real complexity involved in the situations portrayed. On the other hand, some become so complex in trying to model accurately that they are difficult to operate.

Data recording and analysis programs may take several forms. In the data recording format, a matrix is provided into which data can be entered, there upon the computer manipulates it in a predetermined way. For example, data on fish size and PCB content are input for Ohio Sea Grant's "PCBs IN FISH" program, and the computer draws a bar graph to help students visualize the relationship. The "VOYAGE OF THE MIMI" package comes with interfaces for laboratory use in collecting data from the environment: temperature probes, sound sensors and a light meter feed their measurements directly into the computer for students to manipulate.

In the data analysis format, the numbers resulting from the MIMI apparatus may be graphed, compared with known data from certain other situations, or weighted and recalculated. Another data analysis program type provides a data base of real environmental data and allows students to work with it through spreadsheet programs and other types of analyses. Scholastic, Inc's, "WEATHER AND CLIMATE DATA BASE" does this using Appleworks programs.

EDUCATIONAL MANAGEMENT AND CLASSROOM ASSISTANCE programs are not considered to be CAI, but are likely to be used by the teacher alone for support of instruction. Into this category are combined all the uses the computer has for education besides interaction with learners. It may be used to develop graphics for visual aids, run a slide sequence or videodisk program, type handouts, generate tests, keep student records, file bibliographic references -- the list is bounded only by the instructor's imagination and willingness to innovate.

It has not been possible in the course of developing the Software Fair to review and evaluate all the programs that were indentified, so no breakdown by program function is yet available. Neither is it possible at this point to advocate the use of some programs rather than others. Evaluation is in progress, but the process is a difficult one. It is apparent, however, that there is a tremendous range of quality in the commercial software available, and the wise educator requests a preview copy before ordering.

All speculations about whether the microcomputer is here to stay have been answered, "Of course, but..." While most environmental educatros have seen the value of the technology in some form, many remain unconvinced that microcomputers offer them better options for teaching than traditional methods. This is the subject for larger debates than the present forum, because research to date on the effectiveness of microcomputers for education has been inconclusive. With this paper it is simply hoped that precollege environmental educators will become aware of the range of programs available for their curricula.

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THE RECONCEPTUALIZATION OF EDUCATION

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School reform has been the topic of national panels and blue-ribbon commissions recently. Generally focusing on problems of national economic productivity and falling test scores, the mandates of these commissions fall wihtin the narrow confines of higher standards for both teachers and students. Perhaps more importantly, public discourse on education has been narrowly defined by the topics set by these commissions, in effect limiting public debate to concerns of the marketplace with an emphasis on the school's responsibility to provide informed and effective workers for the nations' businesses. While few would prepare future workers, this is not the only role for the schools. Whether the precarious nature of American business is the result of worker ineptitude, if in fact profits are too low, and whether the schools can increase the GNP are all open questions. And they are not the ONLY questions of our times.

I would like to suggest that the environmental crisis and the technological revolution define the contemporary landscape and demand a massive change in the process and content of education. Indeed what is called for is a reconceptualization of education. These themes must be our starting point. This is not the world of the mid-19th century when much of the apparatus of schooling was set in place. Many educational historians argue that the schools were designed to serve the needs of a developing industrial nation. The very architecture and organization of schools suggest this. Schools, run like factories prepared incoming immigrants for a life they were destined to lead in industrialized America (Bowles, 1971). Since that time, schools by in large have responded to pressure from a changing society with minor programmatic innovation and change, leaving the basic structure of the schools intact. In a very broad sense, schools have been used as the public institution that attempts to right society's wrongs. While it is now generally accepted that schools cannot hope to equalize all the disequalizing forces inherent in our economic and social systems, they must be responsive to the fundamental changes in the fabric of our lives.

To a great extent this is the educational message in the writings of John Dewey. Dewey believed change to be the order of things, and conceived of creative intelligence as the human capacity to use change constructively. He called on the schools to respond to current conditions and to address contemporary needs, criticizing the schools for failing to prepare students for the future: "Our schools send out men meeting the exigencies of contemporary life clothed in the chain armor of antiquity, and priding themselves on the awkwardness of their movements as evidences of deep-wrought, time-tested convictions," (Dewey, 1929).

Dewey advocated an action education whereby students were encouraged to experience, through the use of lab classes and partcipation in a democratic community, the meaning of problem solving and democracy. It is true that in many ways Dewey was responding to the educational needs of turn-of-the century America; but more importantly he called on us to see that for education to have meaning it must be rooted in contemporary life, it must be structured so that children will experience abstract ideas like democracy and scientific method and it must develop in the young the capacity to solve problems. In order to make education meaningful in this sense, our first step is to identify those conditions that most profoundly affect our times.

Talk of a post-industrial America, the result of a technological revolution, is very much a part of our everyday lives. Machine-made machines no longer belong to the world of science fiction. Many have suggested the advances in technology offers the possiblity of liberation and freedom (Marcuse, 1970). For others, technology has taken on a life of its own, over which man has no control (Ellul, 1964). Still others discuss informational technology as the most recent innovation in the long march of technology that began when man first plowed the earth: Computers belonging, along with the printing press, to that category of technology that has affected the way we use and store information. Whether one adopts a Ludditian or utopian stance, none dispute the profound impact informational technology is having on our lives and institutions. To date, this revolution has and minimal impact on the structure of the schools.

That we have reached a crisis point in our relationship to the natural environment is all to apparent to those who choose to look around them. Though there is wide-spread disagreement about the severity of our environmental problems, the following are generally agreed upon examples: pollution; increased human population; diminished natural resources; the destruction of wildlife; lose of cultivatable land through soil erosion. Many educators have begun to examine the role schools should play in developing an ecological consciousness they feel is necessary for survival into the 21st century. Some suggest curriculum revision that will lead to instilling in the students an understanding of humanity's interrelationship with nature and our mutual dependence. Still others, drawing on the educational theories of John Dewey suggest that schools must become ecological communities.(Colwell, 1982)

What might a school as an ecological community look like? It would operate on the principle of interdependence, including the students interdependence on each other, the society at large and the natural world. School buildings would be converted into energy-efficient communities, where a student's responsibility would include participation in the upkeep of the school and its experimental projects. In urban schools a roof-top garden could supply the kitchen; in suburban schools edible landscaping could replace ornamental landscaping. Experimental projects, such as those at the New Alchemy Institute and Farrallones Institute could form the science curriculum. Much of the basic-skills teaching could be relegated to a computer, redefining a teacher's job to include work with students on skills like understanding, critical reasoning and reflection. Much of the administrative work of schools could be done by computers, freeing personnel to begin developing and sustaining schools as self-sufficient communities.

While the above suggests a direction that schools could move in, it does not go far enough. A reconceptualization of education calls for an indepth reweaving of the fabric of public schooling, takin into account the potentials of technology and the limitations imposed by the environmental crisis. A vague sense of foreboding heralds this coming age, but it brings with it the potential of a new world for us all. In order for the full potential to unfold we must strip away much of the past, we must get the essential questions and face them honestly. The schools are pivotal in this process and without a reconceptualization of education, the foundation of our school will be unable to withstand the shaking of the world changing around them. They will become relics from another age, unable to empower students with the will and the vision to enter into the creative process of constructing a new society.

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MATHEMATICS IN ENVIRONMENTAL EDUCATION

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Mathematics is important to environmental education because (1) quantifying data is the most effective way to convince the decision makers, and (2) math measures the interactions of the parts of the environment. Conversely, the environment provides a natural place to teach quantitative thinking skills which have become more important in an age of technology. In environmental studies, students at all levels learn conplex thinking skills and attitudes of curiosity and perseverance, qualities stressed in the California Model Curriculum Standards.

In the outdoors children first learn to use manipulative objects to understand the meaning of numbers, the processes of calculation, and quantitative relationships. Then they learn to select and apply the skills of mathmatics to environmental problems.

The current thinking in mathematics education is that every student should enjoy and use mathematics, including higher thinking skills. This necessitates the organization of core units, for which environmental situations provide topics with which everyone in class has a personal connection. In environmental study units, students learn to formulate their own problems. They select what is relevant. They choose from alternative strategies. They detect illogical argument. In contrast to classroom drill, math is a lively session of computational practice in which the answers are important.

The remaining material illustrates specific examples of how mathematics can be taught through environmental situations.

Teaching Mathematics Through Environmental Situations

Problem Solving Strategies

Content	Environmental Applications
Formulate and model problems.	Calculate the distance across a body of water.
Apply mathematical concepts to new situations.	Students learn how to tell the age of fish by looking at their scales. Later they compare ages of 7" trout caught in various water temperatures.

Use a sequence of processes.	Students measure flow of water in a stream: (a) Pace 100'. (b) Measure and average width and depth in several places. Change inches to feet. (c) Clock and average the time it takes a small float to go 100'. (d) Figure out how many feet of water go by each second.
Formulate math problems.	Campers figure out why the showers run out of water every morning.
Number Content and Structure	
Count.	Count stones, shells, cones.
Use fractions.	Decide how many cases of milk to carry out of the cooler to serve 96 people seated 8 at a table.
Raise to a power.	Understand the Richter Scale to measure earthquakes. Find examples of geometric population growth.
Measurement	
Sets	Find out how many petals are on a flower, kernels on an ear of corn.
Line segments	Measure length between nodes on a stem. Find best cross country routes.
Content	Environmental Applications
Time periods	Make water clock, sand timer, or sun dial. Conceptualize length of time since a glacial ice chunk began to flow, till lunch.
Weights	Use pulleys. Find the fulcrum of a homemade scale.
	Determine the slope of a trail or washed area. Use a plum line, plant a tree or set a fence post.
Angles	Find examples that are: taller - shorter, heavier - greater.
Informal comparisons	Span, pace, cubit.
Devise personal primitive measurements, then use standard measures.	Use 3,4,5 triangle to square a shelter.
Explain formulas as a method of obtaining measurements.	Find the volume of water in a tank, the number of plants to be set where there are to be 5 rows of 18 each.
Geometry	
Perceptions of the real world link with math to solve problems that arise in students' lives.	Judge shapes in value, circles, etc.
"Number, measurement and algebra provide tools for dealing with the quantitative features of the environment; geometry provides a visual approach to its organization."	Read sun dials, shadow sticks.

Patterns	Observe ripples on water, scales on a butterfly.
Geometric figures; congruence, similarity, parallelism, symmetry, perpendicularity	Find geometric shapes in nature.

Content	Environmental Applications
Logic	Recognise patterns. Organise data. Use terms such as all, some, and, or, if, then, not. Apply a principle. Draw valid inferences from everyday experiences. Deduct, prove theories. Make reasonable assumptions. Find proofs. Recognise inductive reasoning, enumerations, analogies, patterns, hypotheses.
Algebra	Calculate the flow of a stream. Make up problems using environmental examples.
Thinking Skills	
Understand quantitative vocabulary.	pyramid population density short and long term effects model balance
Think critically.	Understand where math is misused to make invalid arguments.
Read tables, graphs, statistical measures. Judge validity of statistics. Formulate key questions.	Graph population cycles, predator-prey numbers.
Relate. Collect data and develop intuitive notions of probability.	Predict what will happen to the levees if tides are unusually high this winter.
Collect random samples.	Grass blades in one patch of lawn.
Relate two variables.	Grass is deeper green where lawn has received ammonia.
Explore the laws of uncertainty.	A volcanic lake suddenly emits CO_2.

Thinking Skills (continued)

Content	Environmental Applications
Generalize	With a light meter, measure the light available to one plant species in several locations. Decide whether this species requires sun or shade.
Verify and interpret solutions.	Measure the board feet in one lumber pile. Estimate the amount in a yard. Ask the manager how many board feet he has in stock.

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UNIQUE HABITATS: USING THE EXCEPTION TO ILLUSTRATE THE RULE

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What is a unique habitat? I would venture to guess that each of us has explored at least one, and maybe it was no further away than our backyard or local park. Today almost every parcel of land set aside as a park or wildlife refuge is unique in comparison to the developed areas that surround it. It thus becomes especially important for us to make these special places available and known in the community.

Many times people are drawn by the lure of exotic places such as the Galapagos, the Amazon, or the Antarctic and are willing to spend great amounts of time and money to visit them. It is true that places such as these are exceptional. But sometimes it is important to show people the exceptional close to home.

The benefits of increased interest in local areas is self-explanatory. Only through the support of residents can a community maintain wild areas and prevent over-development. By providing training to local teachers, students, and interested citizens any community park or nature center can become a unique place to illustrate ecological concepts. It is very important that we take time to share a view of the land and its wild inhabitants with those who ultimately will decide its fate. This is, of course, the goal of every environmental educator. The question becomes "How can we achieve it?"

Aldo Leopold, in his Sand County Almanac, wrote that "Wilderness is a resource that can shrink but not grow." Whether wilderness is set aside as a preseve or as a conservation area, it includes certain inherent qualities indispensable to an effective and broad-minded science curriculum. Aside from the physical, mental, and aesthetic benefits that accrue form a wilderness experience, school systems near enough to a large tract of primitive environment can utilize wilderness--with proper planning--as an outdoor laboratory. A week-long stay in this natural laboratory, following any necessary student preparation, can function as an unparalleled extension of classroom concepts. Students can easily see the onerous terminology in biology texts--trophic levels, endothermy, ecotone, angiosperm, and the like--come alive with sometimes brutal force. Watching a bobcat kill and consume its prey is a lucky circumstance that can prompt a thousand questions and promote a thousand projects.

Though any public may quarrel over the utility of preservation or conservation areas, school systems really see no dichotomy in terms of student benefit. Both locations can act as outdoor laboratories. A tract of land set aside for preservation can be a study-site for the identification and census of local flora and fauna, for behavior analysis, and for controlled public use. A conservation zone can give students some insight into the short- and long-term effects of planned management. Forestry practices, flood control, and hunting then become issues aobut which the students have some practical knowledge.

Programs led by the instructors for International Student Research have regularly employed two national forests, four national parks (two in South America), one national wildlife refuge, three county parks, and a number of private holdings as research sites. Ideas for projects are generated by the instructors, the students, and any biologists who are working locally for these agencies. The pre-college students who participate in ISR's research programs collect data only after they have had proper classroom instruction and appropriate field-experience. This insures the validity of the data and makes the students more comfortable with themselves as young scientists. Of course, data are collected without cost to the agency involved, are analyzed, and are then turned over to the adjuvant biologists and managers.

Now that budgetary deficits are more likely than ever to minimize general field-research, students and their teachers become considerable resources for wildlife managers and park personnel. Their participation in observations, biological assays, management strategies, and other work in primitive environments should be actively solicited. And their enthusiastic and qualified teachers should be encouraged to use nearby preservation and conservation areas as extensions of the classroom on a regular and well-planned basis.

For teachers, the prblems of providing both actual experience in the field and maintaining a structured curriculum present quite a challenge. We have found, however, that your enthusiasm and interest can have a tremendous impact. Students who have shared an adventure in a place you love come away with a much greater understanding and care for the world than they get in a dozen lectures on land ethics or ecology. With all the hassels of field-trip planning and liability responsibilites, it is easy to get frustrated and remain in the classroom.

But just think for a minute about a place that you treasure even if it is just a quiet, cool spot under a tree in your backyard. It does not take much to generate in your students an appreciation of such places. By visiting local parks or wildlife refuges, you can establish which areas fit your needs in terms of accessability, interest, and safety. It has been our experience that the folks managing these areas are usually willing and eager to help you plan and organize your visit. To increase the effect on the students, however, it is important to give them something to do that is directly involved with the site. For instance, whether we take out students to the Galapagos, Dolly Sods Wilderness Area, Assateague Island, or local parks we always set up in advance a research project for which the students will collect and later analyze data. Many natural areas are seriously understaffed and welcome an opportunity to assess some aspect of their area more quantitatively.

One example of this is the survey of the dark-rumped petrels we conducted with nine students this summer in the Galapagos. Working for four days in the pouring rain we crawled up and down the sides of an extinct volcano and through dense vegetation, searching for the nest burrows of this endangered seabird. Despite the mud, wet, and continued discomfort, the energy and interest that the students shared in helping conduct this study was remarkable. What had previously been another endangered seabird became "patas pegadas," a bird whose sighting would bring everyone rushing to help measure and admire. Days later, while at sea where the bird is not uncommon, each of us mentioned how good it was to find them, wondered whether they came from a burrow we had examined, and secretly hoped that they would safely fledge the year's young. Because they had invested so much of themselves in that research project, these students had a new perspective to bring to their decisions concerning the relationship of man to the natural world.

Unfortunately, we usually have a large class and little time! Projects can be done in segments and that require minimum identification skills provide the most reliable data from a large group. Our seventh-grade class, for example, has been monitoring the same site in a freshwater marsh for four years. By spending the day collecting water quality data and conducting plot surveys of vegetation, they have provided a solid data base used by the wildlife refuge that manages the marsh. This refuge is downstream from a waste-water treatment plant and is a nesting site for bald eagles. Students who have seen the records of increased nesting in the area by the bald eagles get really interested in how their survival and water-quality are related especially when one of the local residents flies overhead to inspect their doings!

Another advantage to using local wild area (and a way to justify day-long trips) is the opportunity to include projects from different disciplines. When our eighth grade spends four days exploring and conducting research on a barrier island, they are also gathering insights and experiences that will be called upon in math, literature, creative writing, and social studies. Including the ideas of other teachers in your science field-trips becomes a way for the student to succeed in a variety of areas. Not every student is turned on to nature by tromping through a marsh or rising at dawn to watch the birds. But when given the chance to write a poem about it, calculate the number of species seen and the frequency, or explore a decaying duck blind, each individual has the opportunity to make that experience valuable and unique.

Unfortunately, the reality of crowded schedules and limited resources sometimes forces us to live with less than the best. Would that we could provide each student with a chance to take an active part in exploring some exotic place! Perhaps we should not forget the valuable studies that can be done on school grounds. A list of all the birds seen at a feeder, or one of those who nest on the property. A careful observation of one tree throughout the school year. Planting grass or flowers to prevent erosion or brighten up a walkway. Each day provides many opportunities for us to share our enthusiasm for what is happening all around us. With just a bit of planning and organization, we can provide our students and other members of the community with a link to the wild. Only by creating a strong personal bond with the earth can we hope to find our natural resources wisely managed and preserved for the future.

A model use of a primitive environment would combine the professional training of agency personnel with the local talents and enthusiasm of pre-college students. Young people are always seeking extra-credit projects, science fair ideas, ways to gain pertinent experience beforestarting their university careers. Too often wilderness is seen only for its recreational value, as a place to escape the coddling of civilization. But wilderness can also provide invaluable research locations where the scientist and the young person can suprisingly find themselves standing upon common ground.

The pre-college student is easily marked by the challenge and adventure of wilderness. It is at this impressionable age that he begins to develop a land ethic, an understanding that land is a community and not just a handful of soil. His sense of responsibility toward the land matures. He begins to recognize the uniqueness of the complex, vast space found in primitive environments. "Wilderness is a resource that can shrink but not grow." The potential of young people is a resource that, when tapped, can turn a primitive environment into an outdoor laboratory and a science curriculum into a lesson in living things.

THINKING SKILLS AND OUR ENVIRONMENT: EDUCATING FOR TOMORROW

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Thinking critically about environmental issues and developing strategies to analyze our thought processes are skills essential to building our future. One need only to read the news, visit corporate meeting rooms, or return from the grocery store to observe how frequently we refer to "oversight", "after-thought", and "hind-sight". In our race to the finish line of human comfort and satisfaction, we leave a trail of environmental destruction in a game where the stakes are high and even "Monday morning quarterbacking" might not save the day.

We have, in an extremely short period of human history, compelled the living organism of the biosphere to tax its natural defense mechanisms as it attempts to survive human development (Larson, 1985). This "humanization of earth" (Dubois, 1980) progresses through a maze of temporary and ill-fated solutions to impending environmental crisis. The health of our ailing ecosystems begs the question, "Are we thinking?" Some would say no; I say yes - but poorly.

The pattern is frequently repeated; our collective responses to planning for our future, solving environmental dilemmas, and living in harmony with our planet are often guided by parochial interests and appear void of intellectual and moral maturity (Larson, 1985).

I challenge you to recall any trend or decision made within the past five-hundred years which stands today as an exemplary model of future planning. If such a model can be found, it may have been initiated by a heretic, a visionary - or both. Most likely an insight capable of enduring the test of time was proposed by an advanced thinker - one capable of effectively synthesizing, analyzing, anticipating, reasoning, and most importantly, one capable of thinking about thinking.

It is not difficult to sight a variety of cognitive responses to environmental dilemmas: "If only we had thought more about the nuclear waste issue prior to the development of nuclear power, "Perhaps the impending extinction of the blue whale, the timber wolf, and the grizzly might effect our lives," or "It looks like we cannot continue to feed a growing world population as we 'develop' our farm lands..."

We, as a global community, have not effectively anticipated consequences. We have not utilized human potential, cognitive skill, and ethical consideration to preserve our very source of existence. Our collective responses, developed through negotiation and compromise, and grounded in democratic ideals, often lack intellectual integrity, and belie moral sophistication.

Our individual responses seem fused into patterns which emerge as what Russian-born psychoanalyst Immanuel Velikovsky calls "collective consciousness" (1982). Velikovsky claims that "global catastrophes of ancient times had devastating effects on the human psyche. Therefore, collectively, mankind acts like an amnesia victim seeking to relive a traumatic event" (1982). Velikovsky's theory suggests fear of successfully indentifying environmental crisis before us and could further indicate lower-level cognitive and moral operations.

Some of us, however, are striving to awaken the sleeping consciousness. We are daring to teach thinking processes and to model thinking at higher levels. Educators, cognitive psychologists, and sociologists are continuously emerging as defenders of educational reform (Sternberg, 1985; Costa, 1985; Paul, 1985; Ferguson, 1980). For example, Richard Paul, a national leader in the critical thinking movement, asserts that "Collectively reinforced egocentric and sociocentric thought, conjoined with massive technical knowledge and power are not foundations for a genuine democracy" (1984). In our fast-paced information age, critical thinking skills and moral integrity coupled with an ability to think about thinking are the hallmarks of genuine democracy and the characteristics of visionaries.

While the innovators cannot agree on one precise defintion of critical thinking, Robert Ennis (1985) suggests that "critical thinking is reflective and reasonable thinking that is focused on deciding what to believe or do." Thus, the challenge for cognitive psychologists and educators is to delineate and demonstrate the characteristics and skills of "reflective and reasonable thinking."

To illustrate, reflective thinking (metacognition) "is our ability to know what we know and what we don't know" (Costa, 1984). This is a keen awareness of what we are doing while involved in thinking. Insight, however, is not enough. We must add to that raised consciousness, essential strategies of planning, self-monitoring and revising to effectively problem solve (Quellmalz, 1985).

All to often we have been told by parents and others when faced with a perplexing situation or circumstance to "just think". Perhaps we are also guilty of conveying the same vague directive to our own students in the form of "..why don't you think about it." As inspiring as this might first seem, we err in assuming our students intuitively know what thinking means in a variety of contexts (Nickerson, 1984).

Thinking about thinking is a complex integration of two essential components: The first is task-oriented and involves the monitoring of task performance (sequencing, pacing, etc.); the second is strategic and involves the selection and understanding of appropriate strategies (focusing on needs, testing of a strategy, etc.) (Presseisen, 1985).

No longer can we assume others understand what we mean by "thinking". The world community must take steps to prepare our "collective intellect" for higher levels of thought. We too, must think about our thinking. By teaching and adopting perspectives of logical thought, future orientations, and critical assessment of issues, we will be better able to formulate appropriate questions and seek viable intellectual and moral responses.

Investigating specific models of critical thinking is too cumbersome a task to explore here. (Refer to Sternberg, 1985; Ennis, 1985; Nickerson, 1984, for detailed taxonomys). However, Richard Paul (1984) does suggest a brief and useful set of "micro-logical, analytic critical thinking skills" which can be taught within the context of instructional areas. He suggests the need for a working knowledge of such terms as "premise, reason, conclusion, inference, assumption, relevant/irrelevant, consistent/contradictory, credible/doubtful, evidence, fact, interpretation, question at issue, problem, and so on" (1984).

Although numerous taxonomys and models for critical thinking exist, the intellectual development theory suggested by Piaget provides a strong base. (The reader is also directed to Bloom, et. al. (1974) for review of the highly influential Taxonomy of Education Objectives). By emphasizing intellectual reasoning, Piaget discovered that learners pass through four qualitatively distinct stages of intellectual development (Ginsburg and Opper, 1969). It should be noted that some experts have questioned the utility of Piaget's framework (Quellmalz, 1985); however, it is still widely regarded as a useful tool to gain insight into one's critical thinking capabilities.

Of particular import is the transition from concrete operations to formal or abstract operations - the point at which the individual begins to develop the mental capability for reflective thinking. However, for a variety of reasons, including the influence of formal education, many adults who are indeed able to perform formal operational thought never achieve this level of cognitive development (Carin and Sund, 1985; Chiappetta, 1976; Nickerson, 1984).

In not attaining formal operational thinking, one lacks the critical thinking skills necessary for meaningful, reflective thought, the ability to develop principles based upon abstract conceptualization, and the capability to make predictions based upon evidence. This not only threatens rational participation in a representative democracy, but also seems largely responsible for the short-sighted planning and decision-making which adversely impacts our environment.

Moreover, the moral implications of lower-level cognitive operations in adult populations are worthy of attention. Hersh, et. al. (1979) suggest a correlation of Piaget's framework of intellectual growth to Kohlberg's stages of moral development and asserts that "people adopting the post-conventional perspective (the highest level of moral judgement) think in the purely formal categories."

Critical thinking skills, then, are essential in fostering advanced moral perspectives. Idealistically, our society is based upon post-conventional moral development; however, with only 20% of the adult population reaching this level (Taylor, 1985), the decisions or trends of society appear to be based upon parochial needs rather than high-level ethical principles. Again, we must examine the foundation of our collective environmental attitudes, plans, and behavior.

The capacity for critical thinking affords us the power to create and maintain our future. By learning and using metacognitive strategies, developing critical thinking skills, and striving for higher-level moral behavior, we can sustain a healthy biosphere. We will also be capable of more thoroughly understanding our collective and individual responses to the environmental challenges before us. Then, in answer to the question, "Are we thinking?", we may confidently respond yes - expansively.

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GETTING WILD

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Project WILD is the most widely used wildlife conservation and environmental education program in the United States today. The organization of the WILD materials and method of implementation may serve as an effective model for development of environmental education curriculum materials targeted at kindergarten through high school teachers.

Project WILD is a nationally-available curriculum program designed for integration into all major subjects in school curricula. The goal of Project WILD is "...to assist learners of any age in developing awareness, knowledge, skills, and commitment to result in informed decisions, responsible behavior, and constructive actions concerning wildlife and the environment upon which all life depends."

Developed and sponsored by the Western Regional

Environmental Education Council (WREEC), and the Western Association of Fish and Wildlife Agencies, Project WILD is implemented by organizations who sponsor the program in their state. WREEC is composed of representatives of the departments of education and natural resource agencies of 13 western states, and is responsible for development of the nationally-recognized Project Learning Tree program (PLT) in co-sponsorship with the American Forest Institute. Utilizing the same approach as WILD, Project Learning Tree has reached over 100,000 educators over the past 10 years.

The "heart" of Project WILD is contained in the Activity Guides (WREEC, 1986); one elementary, one secondary. Rather than a course of study, the WILD guides contain wildlife-based supplementary activities that teach the subjects and skills found in school curricula. Much of the program's appeal and value is in its interdisciplinary and supplementary design; educators can select activities appropriate for their goals and grade level areas.

Project WILD is available only through participation in a WILD workshop. Typically six hours or more in length, workshops provide hands-on experiences with WILD activities. Participants get a close look at how the materials are designed and organized, and are given an opportunity to share ideas and make plans for use of the program. Since modest beginnings in 1983, over 60,000 educators have participated in WILD workshops held in 39 sponsoring states.

In a study conducted of a random sample of teachers who have participated in Project WILD workshops between the Fall of 1983 and the Spring of 1986, 70 percent reported they have used the Project WILD materials. Almost two-thirds of the remaining 30 percent indicated they plan to use the Project WILD materials in the near future. Ninety-eight percent of the teachers who report they are using WILD say they plan to keep using it in the future, with the remaining 2 percent stating they will not be in a teaching situation where use will be possible (Charles, 1986). This study now indicates that more than two-million students received instruction with Project WILD during the 1985-86 school year, bringing the total to an estimated three and one-half million students who have actually received instruction with Project WILD since the Fall of 1983.

The current Project WILD Activity guides contain 113 teacher-written activities which were extensively field-tested and edited before being assembled in final form. When the first edition came off the presses in 1983, it turned out that the activities were primarily about terrestrial habitats. A dream from the beginning was to someday address aquatic habitats, perhaps with a future supplement to the WILD guides. This dream became reality in January 1986 through a cooperative agreement with the U.S. Fish and Wildlife Service.

The Aquatic Supplement draft activities were developed in six writing workshops held in different locations across the country. Participants included representatives of state fish and wildlife agencies, school districts, state departments of education, and other organizations from 28 states. The draft activities were extensively reviewed, revised, and rewritten for educational and technical accuracy. A pilot test for 45 new draft activities and 117 extensions to existing activities will begin in January 1987, and the new Aquatic Supplement Activity Guide is scheduled for completion by Fall 1987.

Although the figures for use of Project WILD are impressive, this represents only a small fraction of the students and teachers in this country. Project WILD is only one of many excellent programs sharing a goal for an environmentally literate population, able to make informed decisions and act responsibly toward the environment. Increasing the availability and usability of any EE program serves to accomplish this goal by helping educators to find and use appropriate resources. A wide variety of quality programs allows educators to select and learners to experience the programs and activities that best meet their needs, styles, goals, and capabilities. The success of WILD in utilizing networks that result in effective and widespread dissemination and use of materials can serve as a source of ideas for all programs who share a worthwhile environmental education goal.

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A SPECTRUM OF STUDENTS' SCIENCE CONCEPTS AND THEIR RELATIONSHIP TO UNDERSTANDING ENVIRONMENTAL IDEAS

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Recent work around the world has concentrated on eliciting children's ideas about science (Erickson, 1979; Gilbert and Pope, 1982; Mali and Howe, 1979; Nussbaum, 1979; Solomon, 1983). From this "new data" several researchers have created new notions that more aptly describe children's explanations of science concepts. Instead of talking about children's misconceptions, which imply a problem with a child's ability to understand, one finds terms such as alternative conceptions, mixed-conceptions and intelligently wrong conceptions, which imply an attempt on the part of the child to make sense out of the world (Ault, 1983; Cohen and Kagan, 1979; Driver and Easley, 1978).

Environmental education is possibly the most innovative of instructional "disciplines" currently included within the school curriculum. Newer than most other disciplines, environmental education necessarily includes an interdisciplinary and multidisciplinary approach to content, and more extensive field and experience-based instructional methods. Environmental education also attempts to teach over a wide range of student abilities and attitudes. It is, therefore, most appropriate for environmental education to apply new data within novel frameworks and contexts.

This paper will use data from several studies of children's science concepts to provide a spectrum of miscommunicated ideas related to environmental concerns. The spectrum will refer to both the range of ideas about a particular concept as well as the range of science topics related to environmental education. It will then suggest several "novel frameworks and contexts" for integrating this "new data" into environmental curriculum and instruction.

Eliciting Children's Explanations of Science Concepts

Conversations with children aimed at obtaining the child's concepts of science have a long history. Piaget in 1929 (Piaget, 1967) provided an initial direction for clinical interviews by describing methods for designing, conducting and analyzing interviews with children. Over the years others have improved and expanded the method of individual interviews (Novak, 1977; Novak and Gowin, 1984; Osborne and Gilbert, 1980a, 1980b; Pines, et. al., 1978). A summary of interview and analysis techniques is available elsewhere (Ault and Cohen, 1983).

Responses of Children During Individual Interviews

Examples of responses of children to standard "school" questions should provide a foundation from which to look at our ability to understand children's conceptions. Suppose you were the teacher of the class where the following answers came from two different students (After Ault, Cohen and Kuehn, 1985). What grade would you give the responses? Please use a ten point system for your grading.

> The question was, "What causes rain?" The responses were: Response 1. "Water comes up from the ground, from the sun, which puts it up into the clouds, and some of the water comes from the sea or ocean. And then the clouds could hit something sharp, like in North Wales a mountain, which could burst it and all the water could come out and rain heavily." Grade ______. Response 2. "When the sun shines the moisture from the ground comes up to the sky and goes into the clouds. When the clouds get wet they get gray and rain." Grade ______.

Many teachers respond to these children's answers by complimenting the children for knowing about the water cycle, but they question the children's understanding of evaporation, condensation, clouds and precipitation. The idea of "hitting" something sharp is especially funny. In general, elementary school teachers would grade both answers as passing. High school teachers are much stricter. But, how poor are the answers? And, can we find the reason for the children's "errors." If the errors are small, will they disappear when the child gets older?

These are difficult questions to answer if we maintain a traditional view of curriculum and instruction. (Not the view prevalent within environmental education.) One has to be able to see these responses from the child's point of view. For example, in both responses the children describe clouds as existing almost as sponges. Water goes "into the clouds." It is difficult for teachers trained in "correct" science explanations to catch some of these "small" errors. We had to read several before the idea of clouds as sponges became apparent. Now, of course, we see this response in all children's answers.

The idea of clouds striking a mountain in order to produce "rain" sounds even wilder. But this explanation of the cause of rain was used by Strabo (64 B.C.? - A.D. 25?) who influenced the thinking of Ptolemy (Boorstin, 1983). For most of us teaching science and environmental education, this form of history is usually missing. And we therefore look at some children's answers as less than perfect. Even Piaget (1967) discounted some of these answers as mere "romancing" or an "answer at random." So it is not unreasonable for teachers to miss some children's errors.

The purpose of this introductory section was to set the stage for a review of some science concepts that have a direct bearing on teaching environmental education concepts. The fact that these concepts might have been discounted as unrepresentative of most children's ideas is a major concern. So one more piece of background should be helpful.

Science as taught in school is only a small part of science (Cohen and Ault, 1984). Science as conceptualized by scientists is often quite different from that of educators. The science explanations of students can be called "children's science" to distinguish it from "scientists" or "school science" (Gilbert, Osborne and Fensham, 1982). Below we provide some examples of "children's science."

Examples of Children's Science

ENERGY - Energy is a basic topic in environmental education. While energy is defined in a specific manner in a scientific setting, children easily confuse its meanings with common language. The following ideas come from Gilbert and Pope (1982). Energy is human centered. You can conserve energy by not working as hard. Energy is a source of force, a causal agent, and can be a battery, flowing water, or a person. Sometimes energy is not a causal agent but an ingredient. Energy is not stored in food, but you can get energy when you eat. In another sense, energy is a by-product like smoke, sweat or exhaust fumes.

Brook and Driver (1984) conducted a similar study of children's understandings of energy. They found energy related to animate objects. Living was commonly associated with energy. Energy was also related to force, movement, a source of activity, and a fuel.

Solomon (1983) demonstrated that children's concepts about energy fell into the two distinct domains of life-world knowledge and scientific knowledge. They could often answer school science questions but did not apply that knowledge to every day experiences.

SOLAR ENERGY - A study of children's and adults' concepts of the sun and seasons has raised several questions related to the teaching of solar energy and the possible problems of implementing solor energy projects (Cohen, 1984). Concepts that were elicited included the idea that the orbit of the Earth brings it closer to the sun during the summer. Many people think the Earth and sun can easily stop, start or change their direction of movement or orbit. Of course, we are all familiar with the idea that the Earth "tilts" toward the sun during the summer and "tilts" away from the sun during the winter. Questions about eclipses and shadows also provided interesting ideas.

With this as possible background, two additional ideas are directly related to solar energy. The first was that many children and adults did not believe the sun shines during the winter. And if there was a sun in the winter it could be a different sun from the summer sun. This was sometimes expressed as the sun is sometimes hotter and sometimes cooler.

In addition to our concern about social, political, economic and technological considerations, this work raises questions about the conceptual problems created by what people believe about the sun and seasons. If people think the sun is not available during the winter, why even think about solar energy?

ECOLOGY - The concept of producers and consumers. At this point you should immediately see several problems with the terms producer and consumer. In a study of 13 year olds in New Zealand, Bell and Barker (Osborne and Freyberg, 1985) asked the children to indicate whether particular pairs of animals were consumers. The students were tested both prior to and after the lesson on consumers and producers. The results indicated that the lesson made "very little impression on the children's prior conceptions of consumer" (Osborne and Freyberg, 1985). However, when similar groups of students were first taught that consumer is another term biologists use for animals, 100% of the students correctly identified the animal pairs as consumers.

Summary

The quality of instruction in environmental education is very high. In general, the instructors are highly motivated. They are dedicated to helping their students gain environmental information and processes and fitting this knowledge within a framework of appropriate attitides. Instructional sequences include hands-on and field settings aimed at interesting the students in the subject and insuring retention and application. It would be unfortunate if this quality was compromised by inattention to research and thinking from other areas.

This paper has only introduced some of the work on children's science concepts that have a relationship to environmental education. There is an enormous field of additional work with specific examples that would help in the planning and implementing of environmental education programs.

In addition to specific examples related to specific content, work with children's concepts has led to several theoretical ideas useful in curriculum and instruction. Some, such as the distinction between children's and scientists' science and alternative conceptions, mixed-conceptions and intelligently wrong concepts have already been discussed. One additional idea needs to be added.

From the discussion about consumers and producers described above it is clear that there is a difference between what we teach and what children learn. Osborne and his team in new Zealand considered this when they planned their initial research into children's concepts (Osborne, Freyberg and others, 1983). They began by defining levels of the curriculum. Curriculum development can be viewed from four perspectives. On one level, the "official" curriculum. Many teachers rework the official curriculum to take advantage of their strengths and to meet the specific needs of their students. In this manner, the "teacher's" curriculum might be different from the "official" curriculum. In spite of the best plans developed by teachers, the "actual" curriculum is often different from that expected by the teacher. And finally, what the child takes away from the class, the "child's" curriculum, might be vastly different from the official, teacher's or actual curriculum.

In general, most time and energy in education is devoted to the official curriculum and the teachers' curriculum. Very little is concerned with what actually happens and what children actually learn. If environmental education is to have the intended impact, it must begin to consider these additional areas of the curriculum.

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TRANSITIONAL ZONES IN THE SECONDARY SCIENCE CURRICULUM

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Transitional Zones and the Environment

In traditional ecological vocabulary, the term ecotone generally refers to the gradual blending of one habitat (such as a biome) into another. Some ecologists feel that ecotones themselves make up their own biome. However, many writers use the term to describe the blending of any size habitats or communities. In this respect, the term "transitional zone" seems to be a little more comfortable to use.

In this blended zone, species of plants from each community are found, offering a variety of food and shelter. Thus, the transitional zone is an area of high species diversity and large numbers of both plants and animals.

In many species, adaptation has led to an evolution of those species inhabiting only the transitional zone. These species (in an estuary, for example) are highly sensitive to a change in conditions such that any sudden favoring of one habitat over another can bring about drastic results.

Transitional zones are necessary for keeping stability within an environment and are found wherever different ecosystems meet. They can vary from one to several meters wide depending upon the local determining factors.

Transitional Zones and Land Management

In typical land management practice, "natural" areas are protected and set aside from development. Usually, they are isolated islands. These areas my or may not include transitional zones. If species diversity is a primary concern for consultants of major developers, their projects should be worked around the preservation of identified transitional zones.

When the public views a developed area, the importance of a transitional zone is usually overlooked. In most eyes they are misunderstood. The natural blending of vegetation, which occurs around the edge of a pond or lake, is considered an eyesore, unclean, and possibly harmful due to the liklihood of snakes or other "unfriendly" animals. Growth of vegetation around the edge of cleared areas, such as recreation fields,. denotes "neglect."

Soon the zones are cleared in favor of a more park-like or "clean" look. The result is a well defined border between areas such as lawns, woodlots, and ponds, resulting in a reduced diversity of vegetation for the encompassing community. In all probability, the most appealing arrangements of vegetation are monocultures or very limited numbers of species. To the layman a high species diversity is considered as clutter. There seems to exist for human beings a natural tendency to unclutter their environment.

Transitional Zones and Education

At the secondary level of education, students enter biology classes with very little background in ecology. Standard biology courses are generally not conducted within an environmental theme. Ecological concepts require a great deal of time to develop with students but receive a nominal mention as opposed to the rest of the general biology curriculum.

Even though the transitional zone concept may be somewhat easy to grasp through the course of discussion in the classroom, it can be very hard to see in the actual surroundings due to its variety of size and appearance. In areas where large communities meet, the transition may be too subtle for easy observation or, in the case of most students, location.

Long-term studies involving transitions should be periodically conducted throughout the term of an ecology course offering the opportunity to not only study transition itself but, in addition, succession, diversity, and habitat management.

Activities Related to Transitional Zones

Activities centering on transition between habitats do not have to be concerned with involved mathematic situations (i.e. a species diversity index). Concentrating on the actual changes in vegetation which can be seen in several local areas will eventually allow for quick recognition of transitional zones as the student travels throughout his or her local environment. These changes in vegetation should concern numbers of different species which can be easily identified by the student. By plotting numbers of different species in corresponding boxes on a gridded map, for example, a student can easily determine where transitional zones can be found. Scientists have a great appreciation for numerical data produced from statistical calculations. High school students need to see and touch the concrete.

Many short investigations involving transitions conducted throughout the term of a biology or ecology course will probably have a greater developmental impact on the student's awareness than one comprehensive unit on the subject. With a little creativity, transitional situations could be set up on practically any school property, allowing for frequent visits and observation.

Ecology is an all-encompassing study of interrelating concepts. No one concept can escape the influence of another. In studying transitional zones, a great complexity in nature can be witnessed, but, an emphasis should be placed on their existence and importance in the environment as insurance for diversity.

Regular presentation of transition concepts to students increases their awareness and ability to make sound decisions concerning future environmental stability.

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WATER QUALITY MONITORING NETWORK

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Ten teachers and 22 students from the Tennessee Valley region participated in a Student Water Quality Monitoring Network sponsored by the Tennessee Valley Authority through a contractual arrangement with the Center for Environmental/Energy/Science Education at The University of Tennessee at Chattanooga. The teacher/student teams received classroom and field instruction in water quality concepts during a three-day workshop conducted at an area state park. Each team received a water quality monitoring kit, a packet of resource materials, and a selection of audiovisual resources on water quality.

Each of the teacher/student teams developed an instructional unit of water quality for infusion into the science curriculum at their respective school or at a lower grade level in their respective school system. The student participants assisted the teacher in the actual instruction of this unit. In addition, each team planned and conducted a research project. The type of projects ranged from evaluating the impacts of waste water discharges on the water quality of receiving streams to comparing natural characteristics of stream drainage areas with different land uses. Specific tests performed included dissolved oxygen, hardness, ammonia nitrogen, and pH.

The overall design of this program was organized around a Science/Technology/Society theme. Science courses typically emphasize science concepts associated with water. Included are the physical and chemical properties of water or such concepts as the water cycle. In the WQMN the emphasis was on the experimental nature of the research projects as an expression of the dynamic nature of science. The problems investigated were often practical in nature, involving the examination of specific factors that affect water quality. Emphasis was on showing how people control or have impact on the environment. This emphasis illustrated a technological focus. Whereas, a scientific goal might be in the search for order in pursuing an understanding of nature, a technological goal might be an improvment in the quality of life. Topics studied that represented a technological focus included hydroelectric power, dams and reservoirs, point and nonpoint sources of pollution, and waste treatment plant discharges.

The interdependence between people who live in the Tennessee Valley and those charged with maintaining high standards of water quality in the region served as an example of a sociological focus. TVA's organizational structure; the mandate to maintain water quality standards; and the cooperation between local, state, and federal agencies all demonstrate this interdependence. Learning to value high standards of water quality and to have this value reflected in one's life style are desired outcomes of this program. Such values were a major focus of the water camp that was held during the summer. This camp served as a culminating experience for the student participants. In addition to formal study, instruction was given in low energy consuming water recreation activities including canoeing, sailing, wind surfing, and kayaking.

Each teacher participant in the program will be presenting the results of their research projects at one of four professional meetings during this academic year. By providing teachers with funds for travel, this program supports the concept of the extended professionalism of teachers. This program has provided a set of unique opportunities for both teacher and student participants. A formal evaluation conducted several weeks after the formal instructional workshop attests to the effectiveness of this program as unequivocally outstanding.

LEARNING TO READ NATURAL HISTORY OBJECTS: AN INQUIRY APPROACH

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One of the key components in environmental education is developing problem-solving skills. The Naturalist Center at the Smithsonian Institution's National Museum of Natural History has developed several exercises which encourage students to use their creative-thinking and problem-solving skills while observing and handling the Center's natural history specimens. The exercises are adaptable enough to be applied in a classroom setting.

What is the Naturalist Center?

The Naturalist Center, opened in 1976, is a resource center containing over 25,000 natural history specimens representing each of the major scientific disciplines at the National Museum of Natural History. Books, scientific equipment, scales and balances, and other measuring tools are also available. The Center's collections are organized, stored, labeled, and catalogued in the same manner as the collections in the research departments. Hence the visitor can get a feeling of what the museum is like "behind-the-scenes." The public can do "hands-on" research, similar to what the museum's scientists do, to identify objects they have found or to simply find out more about a natural history object or topic. Visitors also use the Center's collections as models for art or photography projects.

Why the high school level?

In developing the school group exercises, the Naturalist Center concentrated on the high school level for a number of reasons:

1) The high school audience has often been neglected by museum, nature center, and zoo education departments;
2) Many high school students find the traditional museum lectured tour to be dull and unmotivating and prepared worksheets to be nothing more than disguised scavenger hunts;
3) High school curricula and textbooks include little or no activities which promote problem-solving skills.

The uniqueness of having hands-on resources available to the public allowed the Center to develop activities which could be both fun and challenging to students and would enable them to explore various scientific concepts. One of the main problems in the schools is that teachers tend to concentrate on teaching facts. The question of "What should I know?" becomes more important to students than "What do I think?" and "Why do I think that?". The teacher's factual-based approach limits his function to conveying information and correcting students recitations.

Covering large amounts of material becomes a primary objective in science teaching, with textbooks serving as the only sources of information. In a 1981 study, N.M. Ross found that high school textbooks average between seven and ten new concepts, terms, and symbols per page. In a standard science course, students are expected to learn between 2,500 and 3,000 terms. Over a 180-day school year, with 55 minute class periods, twenty concepts would have to be covered per period, an average of one every two minutes.

With such a teaching approach, one has to wonder what, if anything, students learn. They do learn how to memorize and that to get a good grade, all they have to do is regurgitate the answers that the teacher has already provided. They view science as an absolute product which once established, is set in stone and that somewhere there are scientists who produce all the right answers. What they don't learn is how to utilize their inquiry skills and think critically. Hence, they have little understanding of the dynamic process of scientific thinking.

Another problem with the traditional style of teaching is that it does not allow for student's different learning styles. One student may best learn a concept by reading about it; another may best learn the same concept by using visual aids or objects. And another may best learn by discussion and interaction with other students, a behavior which is not only discouraged but often penalized in the classroom.

Teaching in the classroom may be suitable for certain purposes, however, it is usually isolated from the outside world. If all teaching occurs only in the classroom, students may begin to view the learning process as being confined to the school and not understand that learning is a life-long process which continues everyday and everywhere.

The Naturalist Center's high school program

In an effort to enhance the learning process, the Naturalist Center developed three exercises for high school groups. The exercises emphasize the development of problem-solving, inquiry, and interpretive skills while helping students to discover the concepts of diversity, adaptation, and speciation. In each hour-long exercise students are encouraged to use their imaginations and not to feel pressured into getting the "right" answer. At whatever idea or hypotheses they arrive however, they must be able to defend. Given the open-ended format of the exercises, students are able to experience the excitement of discovery, realize that hypotheses can change as more information becomes available, and are assured some degree of success.

In the "Unknowns" exercise, students play the role of curators. Working in pairs and using reference materials, they find out all they can about a particular specimen, such as a fossil, shell, mammal skin, or bone. Again, the emphasis is not on getting the correct answer or on necessarily identifying the object. It is the process of finding information which is important and which can serve to enhance students' library and research skills.

In the "Adaptations" exercise, students work in groups of four or five and examine six specimens to determine how physical characteristics may help the animals or plants survive in their particular habitats. Each group of students concentrates on one type of characteristic such as locomotion patterns, body coverings, bird beaks, evolutionary trends, eggs, insects, shells, or teeth. As in the "Unknown", students are encouraged to brainstorm and come up with a group hypotheses. Their conclusions are based solely on their own background knowledge and sharing of ideas; they are not allowed to use any reference materials. It is purely a thinking exercise.

The "Speciation" exercise entails higher level thinking skills. Given approximately thirty specimens which are similar in appearance yet demonstrate some variation, students try to determine if the specimens belong to one or more species. They are encouraged to measure the variations, construct a data table, and graph the measurements. From the graph, they are asked to interpret the data. Does the graph indicate that the specimens represent one species? Sexual dimorphism? Differences in age? Demal or clinal variation? The students are further probed as to how scientists could benefit from this type of information.

Students comments on the exercises have been very positive:

> "It was really neat to have the opportunity to discuss the questions with my two good friends. I never realized just how intelligent we are."

> "The best part of the Naturalist Center was that everything was there for you to touch, move, and examine colsely. This makes learning much more interesting. Through my project I learned you must keep an open mind and consider all possibilities...My project...really made me think, searching for similarities between seemingly dissimilar things..."

Teachers have said:

> "It was quite obvious to me that your discovery-inquiry approach is a very effective method - the students were very motivated in what they were doing... We could not believe that they would remain on task for four hours!"

The popularity of the exercises has been evident in the numbers of students coming to the Naturalist Center. In the first full year of the Center's school programs, over 3,000 students, representing 40 schools, visited the Center. However, numbers do not necessarily mean success. What does indicate success is if teachers and students can conduct their own programs in the Center without the help of the staff. The

Naturalist Center is here as a resource to be utilized by the general public and for school-related purposes, it is the teachers who best know how the resources can be implemented into their curricula.

Teacher Workshops

In an attempt to help teachers feel comfortable using the Center, as well as the rest of the museum, the Naturalist Center offers a summer credited workshop, "Learning To Read Natural History Objects: An Inquiry Approach" for local high school science teachers. In 1985, the Center received funds through the Smithsonian Institution's Educational Outreach Program to offer the workshop around the country to help other museum, nature center, zoo, and other natural history-related facility educators work more closely with secondary teachers in developing educational programs using their local resources. Between October 1986 and June 1987, the workshop will be conducted in nine regions of the country. For additional information on the workshop of the Naturalist Center, contact Peggy Millett, The Naturalist Center, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

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ENVIRONMENTAL CONTROL IN SPACE LEARNING ACTIVITIES

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Late in the 1960's we viewed the planet Earth from space. Armstrong said, "That's one small step for a man, one giant leap for mankind." It is remarkable that, in the shoulders of giants, we were able to travel so far in so short a time. It is remarkable that, building on basic science principles and hedging our designs with backup systems, we identified the exploration of space as a goal and succeeded so well. It is remarkable that this "new frontier", this "moral alternative to war", ignited the astronaut in all of us. Space is almost as effective a teaching medium as the environmental science activity.

The design of environmental control systems (ECS) for spacecraft has, at least, academic interest to the environmental group. Here, we shall attempt to briefly describe the ECS for suborbital and short orbital missions, and the more comprehensive system under development for the Space Station. Early systems were short term or "open loop" solutions similar to the disposable diaper. The Space Station requires that we develop "closed loop" or regenerative environmental control and life support systems (ECLSS).

Finally, we will discuss the educational potential of aerospace activities and identify some learning resources.

The heat shield diameter of Mercury capsule was 1.89 meters. The spacecraft weighed about 2,000 kg at launch and 1,100 kg at recovery. The heat shield diameter of the two-man Gemini spacecraft was 2.286 meters. The spacecraft weighed about 3,400 kg in orbit and 2,200 kg at splashdown. These spacecrafts, like the bigger Apollo to follow, provide a 100 percent oxygen atmosphere at 258 mm Hg or 5 psi pressure. The atmoshpere was revitalized using lithium hydroxide for carbon dioxide removal and activated charcoal/filters for odor and particulate control.

About 100 kg of the Apollo's 290 kg liquid oxygen supply were intended for environmental control. A fifteen liter drinking water supply was maintained from fuel cells. The lunar module also used the one-gas system. The moon landing from Apollo 11 came on July 20, 1969 at 10:56 EDT.

The unmanned Saturn Workshop (Skylab) was launched May 14, 1973 at 12:30 p.m. CDT atop a Saturn V launch vehicle from NASA-Kennedy Space Center. The Skylab ECS was a two-gas system at 5 psi total pressure and with oxygen partial pressure controlled to about 3.6 psi. Carbon dioxide was removed by one of two molecular sieves. Carbon dioxide levels were to be maintained below 5.5 mm Hg for normal operation and below 15 mm Hg for emergency conditions.

Three crews lived and worked in Skylab during the next nine months. The Skylab launch problems corrected by the first crew and the scientific studies attempted make fascinating reading. What was accomplished?:

- We proved that we could live and work while weightless for long periods.
- 2,476 orbits for 70.5 million miles of travel.
- Nine extravehicular activities (EVA) logging nearly forty-two hours.
- 182,842 Apollo Telescope Mount film frames.
- 40,286 Earth Survey film frames.

Some data from the Skylab Mission ECS Evaluation Report may be of interest: (1) The crews were basically comfortable and healthy. (2) The metabolic guidelines which appear to match the flight data are 440 Btu/hour/man, 1.84 lb/man day metabolic oxygen usage, 2.6-4.1 lb/man day water production, 2.15 lb/man day carbon dioxide production.

Skylab fell out of orbit, broke apart, and returned to Earth on July 12, 1979. Eighty percent of the debris was scattered over water; the remainder over Australia's sparsely populated interior.

The Space Shuttle is well known. The Orbiter resembles a wide-body jet with an overall length of 122 feet and a wingspan of 78 feet (about the size of a DC-9). Its crew module is located in the forward fuselage section. It contains an upper level flight deck/control center, a passenger cabin/galley/dormitory/bathroom/lounge on the lower level. The flight crew consists of the commander, the pilot, and the mission specialist. There are additional seats for a payload specialist and three scientists. There are four sleeping "restraints"...three one above another...and a fourth hanging vertically. In the rear wall there is a personal hygiene cabinet containing a toilet with seat belt and a sink for all over sponge-washing (mission length did not justify a shower stall). There is also an airlock connecting the crew module to the cargo compartment. Available are the space (EVA) suits and the Manned Maneuvering Unit (MMU). The ECS is much like that of Skylab pressurized however, to atmospheric pressure with a mixture of 22% oxygen and 78% nitrogen.

The cargo bay is sixty feet long and fifteen feet in diameter. It can accept payloads of up to 65,000 pounds and its clam shell doors when opened serve as radiators to space to provide thermal control. From the aft end of the flight deck, the flight crew can manage cargo operations. An extendable boom, the Manipulator, can be controlled from this station. Spacelab, a reusable laboratory system first carried in the Columbia cargo bay in 1983 and developed by the European Space Agency, has ECS similar to that of the Shuttle.

With the Space Station comes the need for limited or no overboard venting and closed loop, regenerative ECLSS. The ECLSS may be divided into seven subsystems shown in Figure 1. Additionally, refrigeration/freezer, high/low temperature fluid services are provided. The ECLSS are distributed and interconnected to serve Space Station habitability and laboratory modules.

Space Station design required consideration of complex interfaces. These include structures/mechanisms/materials, thermal control, power, propulsion, data management systems. Responsive to all constraints and interfaces, the initial ECLSS concept shown in Figure 2 uses ACS, THC, and FDS similar to those used in Skylab, the Orbiter, and Spacelab. Atmospheric revitalization (AR) has a closed oxygen loop. Oxygen is generated by carbon dioxide reduction and either routed directly to the cabin or compressed and stored.

Aerospace technology is an important educational pursuit for its own sake. More importantly, however, it provides an exciting springboard for the studies of the sciences. Views of earthrise have not brought peace to the world, nor less litter. But, even as we market and consume nonrenewable resources, we know that there is international interdependency among all species of life. The social scientist cannot ignore the physical and life sciences; he or she has an opportunity to use the other sciences as tools...for example, international role playing, what if/when world population at six billion, common attributes of astronauts. The science teacher can teach basic scientific principles by asking questions...examples:

- Why launch from west to east?
- Why does the Orbiter angle into space upside down?
- Why seat belts, shoe and sleep restraints in space?
- Make a life support system for a plant.
- How has spacecraft design influenced our lives?

There are many informational resources for the teacher. The writer was fortunate in having close at hand the NASA George C. Marshall Space Flight Center (MSFC) and the Alabama Space and Rocket Center. MSFC maintains a Teachers Resource Center at the Space and Rocket Center. There you may view publications, copy slides, and videotapes. You may request information on spacecraft, have slides, and videotapes copied on your exposed film and videotapes by mail. School presentations may be scheduled. You have only to contact the NASA field center nearest you. You may be added to the educators' mailing list by writing to NASA Educational Publications Services, LEP, Washington, DC 20546.

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THE INCREDIBLE EDIBLE CHEMICAL LANDFILL
CREATING A MODEL FOR CHEMICAL WASTE IN THE U.S.A. TODAY

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It is difficult to read a newspaper, listen to the radio, or watch television without hearing something about toxic hazards. Topics may range from; the transport of hazardous materials, their manufacture or use, to; problems with disposal or potential exposure to the public. Consequently, it is important for environmental educators to deal with issues relating to chemical waste and how it relates to the products we demand and consume. Do we really determine what is available?

If we are to be successful as environmental educators, our success should be measured by how effectively we guide students in becoming environmentally responsible members of society. It is only through an informed public; informed on many aspects of an issue, that society can begin to make decisions and act on problems facing the quality of life on the planet.

There are many means available to inform students on current environmental problems. For most students the school or local library is the most logical starting point. Newspapers and magazines provide valuable resources. When viewing articles concerning a given topic over a span of time students may begin to unravel the story and see how it fits into the big picture.

There are compilations of magazine and newspaper articles in the SIRS series (Social Issues Resources Series). Volumes exist on topics such as energy, technology, and pollution.

The New York Times is indexed. This eliminates the need to know the date of an article before finding it. Getting students to clip articles from the local paper may be a good current events or extra credit project, but having a newspaper indexed opens up many possibilities to the serious researcher.

Frequently the films available to educators are created by manufacturers or their trade organizations (lobby groups). Such "free" sources of content material are therefore biased and if used should be critically examined for their value as an information tool. Likewise, there are many special interest groups which provide materials that portray only the environmental side of an issue; Examining the source of materials used is an important part of analyzing the validity of the content and develops critical thinking skills.

Students may gather information independently be designing and conducting surveys within the school or out in the community. In conducting surveys however, it is important to be aware of the emotionally charged nature of many issues. Discretion must be employed in order to keep the poll as informational and useful as possible. Getting people excited by perpetuating fear about health and human safety from real or imagined environmental hazards does nothing to address fundamental issues. Real solutions come from rationally examining the information available.

Other sources of information may come from governmental agencies. The EPA still maintains a staff and has some materials available. State departments of environmental protection, or departments of environmental resources can probably supply the most relevant information concerning current environmental regulations.

Guest speakers can provide valuable insights into problems as well as solutions in areas of environmental quality. If more than one speaker can be scheduled students can listen to opposing viewpoints and can judge for themselves.

Field trips to a local site of contamination may be unfeasible (as well as hazardous). It may, however, be possible to visit planners, industrial manufacturers, or waste treatment facilities.

Wherever possible it is important to get students to see the interrelationships between variables. Raising questions such as; just where chemical waste and hazardous materials originate, why are they present in the bioshpere, how do they affect our quality of life (both positively and negatively may help students to gain a better understanding of the costs of our way of life.

Some students may be taking a course in government, economics, or other related field. Correlation between the courses may help students make connections. Through such correlation, it may be possible to get students interested enough to write to a newspaper editor or legislator.

Depending on the level of sophistication of the students and the teacher, one can get as scientific as possible. Innumerable labs from the physical sciences illustrate concepts pertinent to environmental studies. Applying such concepts is probably one of the most challenging aspects to teaching environmental studies.

To culminate an environmental studies unit, the "edible chemical landfill" is sure to generate interest, discussion, and provide some rather interesting insights into the problems associated with toxic waste in the USA today. If possible slides should be taken of the activity in progress, or if video facilities are available a "candid camera" approach may be used.

Recipe - Suggested Ingredients

1. 3 different flavors of jello (minimum)
2. Pistachio pie filling
3. Chocolate pudding
4. Butterscotch pudding
5. Pineapple ice cream topping (chunky)
6. Creme de Menthe ice cream topping (syrup)
7. Licorice swizzles
8. Root beer barrels
9. Jelly/nouget candy
10. Iced blue lozenges

Procedure

1. Obtain a container to use as the mold. A large tupperware bowl works fine.
2. Pour in a layer of jello and allow to set. Remember the first layer poured will be the top of the landfill, but will have the rest of the layers on top of it in the bowl.
3. Add root beer barrels, licorice swizzles, or any other materials to the layer when it is partially gelled.
4. Pour successive layers and add barrels, etc. Let mold set.

After studying some of the issues involved in chemical waste in the United States today it should be interesting to see what kinds of decisions we can make regarding disposal and treatment. I have constructed a model of a chemical landfill. Can you identify the liner? Notice the leachate seeping out. Let's see if we can eliminate this waste before the end of the period. I will now remove the liner so you may inspect the contents. (Explain that all materials are edible and list ingredients to the class). Our edible landfill will represent all the chemical waste in the USA today. Proper treatment of the waste will be represented by consumption of the jello mold. If each of us will take an equal share of the jello mold and consume it, there will be none left at the end of the period. Whatever material remains will continue to be a problem for future generations.

Discussion

Here, it will be up to the instructor and/or class to decide how treatment of the waste will be conducted. Keep in mind the nature of this model. And look for applications to real life situations. Listed below are some possible applications.

Model	Real World incredible
edible landfill	chemical waste in the USA
mold	liner
root beer barrels	barrels of toxic waste
jello	chemical sludge
iced blue lozenges	aromatic, organic wastes
liquids formed	leachate
eating the jello	proper treatment
discarding the jello	illegal dumping
extra credit for eating	incentive

Summary

Results will vary from class to class depending on age, interest, setting, etc. It is hoped that more applications will be observed and noted to make the model more "real". Some students may opt for drawing straws to see who will be responsible for treatment. A discussion of the sources of chemical waste would be valuable. Stressing that chemical waste is not produced as an end in itself, but is a by-product of our way of life will point to the fact that we are all responsible for its generation. The edible landfill is not very aesthetic or appetizing, and it should be pointed out the problem of chemical waste is not a very pleasant topic either.

AN OREGON ENVIRONMENTAL EDUCATION POTPOURRI: EVERYTHING THAT'S AVAILABLE AND SOMETIMES FREE!

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Oregon Dept. of Fish & Wildlife
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This session will introduce Conference participants to Oregon EE programs such as: Away with Waste; Energy, Food and You; Salmon and Trout Enhancement Program; Water, Water Everywhere; SOLV and publications such as: Clearing, School Ground Classroom and Built Environment. Presentors described the Environmental Education Association of Oregon, discussed the advantages of a regional organization and offered advice on the establishment of a regional consortium.

TEACHING KIDS TO INVESTIGATE ENVIRONMENTAL ISSUES

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This workshop will focus on issue investigation and citizenship action skills and will feature a series of modules designed to teach youngsters the skills needed to investigate and evaluate science-related social issues (Hungerford et al, 1985). Participants will review curricular materials and several activities will be used to demonstrate the methods used in the development of responsible and active student-investigators. Research conducted on the program will be reviewed and discussion will follow.

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LEARNING WITH OTIS: AN ELEMENTARY CONSERVATION EDUCATION PROGRAM

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Learning With Otis is an elementary program for grades 1 - 6 developed by the Missouri Department of Conservation and designed to provide teachers with practical conservation education activities. When infused into the existing curriculum on a regular basis, conservation becomes an integral part of each child's total learning experience. The major component is an activity book (one per grade) divided into 8 resource topics with a number of lesson plans included under each topic. Teachers periodically receive classroom quantities of a student conservation education newspaper. Although written for Missouri, the program could be modified for use in other states.

LEARNING BY DESIGN

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American Institute of Architects
Washington, D.C.

A hands-on exploration of how we learn, perceive, and make decisions about the environment. The session participants will discover their teaching/learning styles, explore the design process as a decision-making tool, and learn to locate local resources for classroom use.

PLT AND THE BAY - A NEW CURRICULUM MODEL

Gary Heath
Maryland State Department of Education, Baltimore

Kathy Ann McGlauflin
Project Learning Tree, Washington, DC

Curricula that address local environmental problems with up to date information and first rate activities are hard to find. Project Learning Tree (PLT) and two Maryland agencies have cooperated to develop curricula addressing the problems of Chesapeake Bay that meets these needs in a very attractive package to educators. We will run through some activities and discuss the advantages this model offers resource agencies, curriculum developers, and teachers.

RED GOLD: SIMULATING THE MANAGEMENT OF THE SALMON FISHERIES OF BRISTOL BAY

David Miller and Jerry Lipka
Bristol Bay Curriculum Project
Dillingham, AK

High school teachers, undergraduate university students, and university faculty in southwestern Alaska are currently collaborating in the development of several locally-relevant curricular products. One such emphasis has focused on the development of different scenarios for the management of Bristol Bay's world class salmon fishery, via conputer-simulation and an associated data base analysis. Our presentation will demonstrate examples of this work, along with other information technology-associated products emergent in this area such as digitized photographs, and transparencies.

CHALLENGING THE EXPECTATION LEVEL OF FIRST GRADE ACHIEVEMENT IN ENVIRONMENTAL EDUCATION: FOCUS ON FILM

Judith Gorius
Newark City Schools
Newark, OH

Lillabelle Holt
The Ohio State University, Newark

A multidisciplinary unit for first graders was developed, based upon the prize-winning film BAOBAB: PORTRAIT OF A TREE. The film (recommended for junior high to adult), other content and activities were used to challenge the young learners. The results will be shared with slides, video tape, and examples of activities including a surprising TREE FAIR. Materials will be distributed; discussion will focus on the project, and on environmental concepts, skills and attitudes for the primary grades. What are appropriate expectation levels for first graders?

EARTHSCOPE: HUNTSVILLE CITY SCHOOL ENVIRONMENTAL EDUCATION PROGRAM

Jim Black, Dave Brotherton, Hethalyn Godwin
Earthscope
Huntsville, AL

Our presentation will show how Huntsville City Schools created an education program without the expense of developing an environmental education center. The secret was to utilize on-site locations and to adapt activities to them. The following on-site locations and corresponding activities will be discussed: cemetery - combines compass reading, orienteering, and local history; water purification plant - the drinking water cycle and water treatment; animal shelter - teaches pet responsibility and contact with animals; nature trail - tree classification, ozalid prints.

NEW DIRECTIONS FOR SCIENCE EDUCATION: NEEDED PRIORITIES FOR ENVIRONMENTAL EDUCATION

Paul Hart
University of Regina
Regina, Saskatchewan

To paraphrase NAEE President, John Disinger, environmental education has not established an accepted position in schooling, pedagogists have not adjusted their frames of reference to incorporate it and individual teachers find it difficult to overcome the inertia of a system in which established priorities are perpetuated to the exlusion of more current concerns. This paper explores an alternative way of viewing the difficulty facing the educational establishment in attempting to achieve closure on environmental education as a curricular entity.

THE ENVIRONMENTAL STUDIES PROJECT: CURRICULUM DESIGN, IMPLEMENTATION AND EVALUATION

Bailey Green
University of California
Berkeley, CA

Jim Harrison
Environmental Protection Agency
Atlanta, GA

Highlights of the four course curriculum design and innovative classroom and field education activities provide an overview of this three-year pilot project in several Atlanta area high schools. The comprehensive evaluation including (1) pre-tests, (2) student evaluations, and (3) a peer review by a team of educators and environmental professionals will be discussed, and methods and processes will be illustrated. The role of evaluation in the wider implementation of new curricula will also be discussed.

CRITICAL THINKING - SIFTING INFORMATION REGARDING ENVIRONMENTAL ISSUES

Richard Mrazek
University of Lethbridge, Alberta

If one considers environmental education to be a life-long process, then critical thinking may certainly be one of the key skills necessary for environmental educators to practice. All those interested in understanding our environment and making sound decisions regarding our relationship within it are constantly required to sift through an overwhelming amount of information related to environmental issues. This presentation outlines the structure and piloting of an Environmental Education Instructional Unit written for Alberta Environment and designed for use in Alberta High Schools.

PANEL: SONJA GROVE, OREGON STATE TEXTBOOK COMMISSION

Portland, OR

Ken Hart, Vice President
Oregon Wheat Growers League
Moro, OR

Earlier this year The Oregon Textbook Commission approved a controversial fourth grade geography textbook entitled Get Oregonized, authored by a professor of Education at Oregon State University. The book was supported in part by a number of prominent agricultural, timber, and industrial interests in Oregon. Oregon environmental groups contend that Get Oregonized lacks balance in portraying development and conservation interests in the state.

The panel will discuss the book's development, its adoption by the Textbook Commission and implications of the textbook adoption process for environmental education. The issue has continued relevance as a follow-up work, to be entitled Global Oregon, is reportedly being prepared for the tenth grade level.

PRODUCING A WATER LITERACY PROGRAM FOR ALBERTA STUDENTS

Mary Krupa, Legal, Alberta

"Water literacy" is the latest from the Alberta Education and Alberta Environment departments. A series of 6 week units for Grades 4-12 is being planned and will be piloted in 1986. My presentation describes the product and process of the Grade 6 level unit and includes: organization strategy, planning objectives, organizing lessons, and leasing with technical and instructional specialties.

THE CHANGING ENVIRONMENT IN WASHINGTON STATE: A REVIEW OF K-12 CURRICULUM

Elizabeth Hoenig
Washington State Office of Environmental Education, Seattle

The Washington State Office of Environmental Education has been developing innovative interdisciplinary curricula since it was established in 1970 as part of the basic education series within the Office of the Superintendent of Public Instruction. Five of our most timely and popular guides will be introduced.

ENVIRONMENTAL LITERATURE FOR YOUNG READERS

Duane Toomsen
Iowa Department of Public Instruction
Des Moines

Literature for young readers is readily available in the bookstores and in our libraries. How do we make the story meaningful? How do we use the learning cycle to make the literature have breadth and meaning? Share in this session and discover useful techniques whereby students can actively participate in an activity resulting from a story shared. Stories by Byrd Baylor, Peter Parnall and a host of others will be shared, as well as bibliography of useful books for young readers.

OF STARS AND BEARS AND LOSS OF CARES: TEACHING SCIENCE THROUGH THE ARTS

Jay Liebovitz, Insight Out Productions
Mill Valley, CA

Music and storytelling are particularly effective tools for teaching. This interactive workshop will include music and stories, bibliographies and discographies, and discussion of how to incorporate live and recorded music and stories and community arts resources into teaching science at all levels. Other arts, including visual arts, drama, and dance, will be included in the workshop.

DID DARWIN NEED A COMPUTER?
THE VALUE OF LOW-TECH SCIENCE IN A HIGH-TECH WORLD

Bruce Rinker
The Langley School
McLlean, VA

Students today are presented with a bewildering assortment of high-tech opportunities for learning. These high-tech models too often are used as primary teaching tools without basic field-knowledge. Personal experiences in the field are often keys to motivating a student's curiosity. For example, an owl pellet examined in the field is more valuable than a simulation illustrating food webs. Field-experiences are opportunities to discover something new while exploring woods, fields, and streams. Discussion and examples will focus on ways to develop and carry out programs utilizing the best of high technology and the natural world.

A BAGFUL OF ENERGY

Franklin Jones
Radford University
Radford, VA

Through various mathematical calculations students learn the energy and resource values involved in the production of a bag full of recyclable aluminum cans.

WREEC: THE GREAT WESTERN WRAPAROUND

Ray Theis
Oregon State Department of Education, Salem

This presentation describes the role of the Western Regional EE Council in facilitating and energizing the EE efforts of the Thirteen Western States since its formation in 1970. WREEC has gained national attention through its well known programs: Projects WILD and Learning Tree.

Teacher Education

ARE TEACHERS ENVIRONMENTALLY LITERATE?

Chris Buethe
Indiana State University

Two parallel studies of teachers' environmental literacy were conducted by the investigator in 1975 and 1985 in Indiana. The studies were supported, in part, by grants from the Indiana State University Research Foundation. Assistance was provided by the State Department of Education. Each time, 500 certified elementary and secondary teachers were randomly selected, then polled by means of three mailed self-tests that had been designed for the study. The questionnaires included more than 120 items each, most of which had been suggested by nationally recognized scientists and/or educators who work with environmental and related energy concerns.

Analyses of results indicated that teachers were marginally literate regarding their physical environment. Although 1985 marks were higher than those of a decade earlier, in each case many environmental terms and concepts were not known. Fewer than half of the teachers indicated that they knew the meaning of terms like biosphere, effluent, fly ash, particulate, and scrubber. Even media-repeated terms like catalytic converter, dioxin, and superfund were unknowns to more than two-thirds of the 1985 teachers. Only 3% knew the meaning of non-point source.

Multiple-choice items that emphasized knowledge related to environmental terms revealed that
4 of 5 underestimate fossil fuel use rates by 10X or more
3 of 5 appear not to understand "watershed"
1 of 2 are unfamiliar with energy efficiency ratios
1 of 3 do not recognize the sun as prime energy source
1 of 7 believes that most Indiana electricity comes
from waterfall, rivers, or chemical batteries.

Half or more did not recognize ethylene dibromide as a toxic substance or know that Indiana has no operating nuclear power plants. More encouraging is that 1985 teachers recognized more environmental terms, knew more about environmental and energy problems, and were more aware of their own knowledge related levels than were their 1975 counterparts.

Between 1975 and 1985, a shift appeared regarding teacher attitudes toward selected environmental expressions. Likert-type scales, with ± 6 the limits, revealed contrasting values:

Expression	1975 Mean Response	1985 Mean Response
Nuclear Energy	+3.55	+1.21
Electric Heating	+2.78	+1.05
Auto Weight Tax	+1.15	+0.47
Industrial Water Use	+0.38	+0.95
Factory Effluent	-1.36	+0.24
Strip Mine	-1.68	-0.31

Apparently, Indiana teachers have changed their views of some environment-energy-economy relationships. They may be less critical of industries than previously, but remain somewhat negative about strip mines while living in a mining state.

In both studies, younger teachers were the least informed. As expected, science teachers scored significantly higher "literacy" marks than did social studies teachers or others. In 1985, the statistical significance of mean score differences favored males and secondary teachers over females and elementary teachers. Such was not the case in the earlier study.

Despite some improvements, Indiana teachers have not been shown to be environmentally literate. It is suggested that environmental education is a job for all teachers, and that science teachers and their students can help to spread literacy.

Educators in other states may wish to conduct studies similar to those reported here. Regional and local differences are anticipated.

Combined efforts by individuals and agencies are sought, in order to improve the environmental literacy of teachers.

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TEACHING TEACHERS TO TEACH ENVIRONMENTAL ISSUES

Trudi L. Volk
Southern Illinois University at Carbondale

The literature of environmental education (EE) contains many references to its overriding aim of producing environmentally responsible and active citizens (Hungerford, 1975; McKenna, 1973; Stapp, 1970; Tbilisi Intergovernmental Conference on EE, 1978). It would seem logical that the development of such an environmentally literate citizenry demands educators who are themselves environmentally sensitive and knowledgeable, skilled in responsible decision-making, and active in environmental maintenance and remediation. Further, these educators should be able to assist learners in developing the knowledge, skills, and attitudes prerequisite to participation as citizens in environmental problem-solving. The results of several studies, however, suggest a considerable need for teacher education in those dimensions (Champeau et al, 1980; Peyton and Hungerford, 1980; Volk et al, 1984).

In an effort to assist teachers in undertaking environmental issue instruction in their classrooms, the National Science Foundation funded a project jointly sponsored by Murray State University in Kentucky and Southern Illinois University at Carbondale (1985-86). Thirty-one middle school teachers (grades five through nine) from Kentucky, Illinois, Missouri, Kansas, and Wisconsin participated in the year-long project, which included a five-week summer instructional component and an academic year phase for implementing issue instruction in the teacher-participants' classrooms. This paper will describe the teacher training aspect of the project.

Foundational Instruction

The five-week instructional component focused initally on ecological concepts and principles which are foundational to an understanding of environmental issues. Utilizing both classroom and field experiences, this component led the participants in acquiring basic ecological knowledge and in relating it to regional resource use and to the issues which have arisen over that resource use.

Subsequent to the foundational phase, teacher-participants were exposed to a variety of environmental issues through two instructional modes: a case study approach and a skill development model. Instruction in both modes is appropriate for youngsters at the middle school level. Both modes were presented in order to give each participant flexibility in selecting and implementing issue instruction in his/her unique classroom setting. Those two models are presented below, accompanied by a discussion of the teacher training appropriate to each model.

The Case Study Approach

An environmental case study might be defined as "an analysis of a man-centered ecological issue which utilizes accumulated record, or other collections of evidence... social, biographical, biological, physiological, and environmental... that provides information to explain the status of that issue" (Adapted from Ramsey, 1979). In the case study approach, the teacher gathers information related to a discrete environmental issue from a variety of sources and utilizes instructional methodology which will aid the learner in gaining a greater understanding of that issue. Essentially, case studies promote the awareness of environmental issues and have three major components: delivery systems, analysis techniques, and summary/synthesis techniques.

The purpose of the delivery component is to present appropriate information to the learner. A variety of delivery systems exist, and it is incumbent upon the responsible educator to insure that adequate information is provided to the learner in order to present an unbiased and multi-sided treatment of a particular issue. Sources which might be used include articles from current periodicals, videotapes of timely television programs, commerically available films and videotapes, guest panelists, original data and records, field trips, and experiments or demonstrations.

While the presentation of information is an important component, information alone can prove overwhelming and confusing to youngsters. Thus, a second component of case study instruction is the introduction of analysis techniques which permit learners to distill information and organize it into a conceptual format. Methods pertinent to his component might include issue analysis (i.e., identifying the players, positions,, beliefs and values involved in a discrete issue), tracing the historical development of an issue, delineating the 5 W's of an issue (who, what, when, where, why), and identifying the ecological and socio-cultural outcomes and consequences associated with a discrete issue.

Summary/synthesis techniques are designed to summarize the essence of the issue under study. Effective techniques include role-playing simulations, written and oral reports, debates, and other students products (videotapes, slide presentations, posters, etc.). Activities at the summary stage should allow learners to synthesize various aspects of a discrete issue into a meaningful whole which evidences their understanding of the issue.

In training teachers to utilize case study instruction, a singularly effective strategy is to introduce the case study format with its major components, and then to take the teachers through the case study of a particular environmental issue. In a remarkably short time, teachers become quite adept at various analysis techniques and excited about thier potential for use with youngsters. Teacher-training with respect to case studies should also alert teachers to the large variety of information sources available for adding to and updating the case study of a particular issue from time to time. Additionally, attention must be directed to the logical sequencing of the information and to the appropriateness of the analysis techniques. A major advantage of the case study approach is that it permits teachers to infuse environmental issue instruction into existing curricula, e.g., utilizing a case study on local energy issues in conjunction with a traditional unit of study on energy production; utilizing a case study on acid rain or strip mine reclamation in conjuction with a traditional unit on coal mining.

The Skill Development Model

If the case study approach is best described as an awareness-oriented approach, then the skill development model must be defined as action-oriented instruction. This model seeks to develop learners who can autonomously investigate and take responsible citizen action regarding environmental issues. In preparing teachers to utilize this model with learners, an extremely effectigve strategy uses a Deweyan approach - the teachers learning by doing...i.e., the teachers themselves receiving training in investigation and action techniques. It should be noted that an overlap exists between aspects of the case study approach and early components of the skill development model, but as will quickly become apparent, the skill development model begins with an awareness of issues and builds beyond that level.

Skill development, then, begins with issue analysis and develops within learners the abilities to identify and differentiate between environmental issues and problems. Other skills involved in issue analysis include the identification of players, positions, beliefs and values associated with discrete environmental issues, classifying issues on several dimensions, and formulating research questions.

Learners are also taught how to effectively utilize both secondary and primary sources of information for researching issues. Locating and using appropriate agencies, resource people, and library sources are important aspects of information gathering. Additionally, learners must become adept at analyzing information (and information sources) for bias. The ability to compare and contrast discrete pieces of information and to identify the values and beliefs inherent in each are powerful analytical tools in the investigation of issues. Primary information might be gathered through the use of instruments such as surveys, questionnaires, and opinionnaires. In training individuals in the design and administration of survey instruments, an application component is necessary...whether those learners are youngsters or teachers. In the NSF project, teacher trainees were required to work in small groups in identifying an environmental issue of concern, and in designing and administering a survey instrument which would collect primary information related to that issue. Thus, as examples, one group of teachers surveyed local service stations with respect to their disposal of used motor oil another group surveyed local eating establishments to determine the relative amounts of smoking and non-smoking areas; and, still another group surveyed local fast-food outlets in their use of packaging containers (renewable versus non-renewable bases).

Subsequent to data collection, attention must be focused on the interpretation of those data. Therefore, instruction must be provided on generating logical conclusions and inferences, and on making appropriate recommendations based on data, rather than on emotion.

At this point in skill development, the learner (and the teacher trainee) should be prepared to conduct a thorough investigation into a self-selected environmental issue. Such a thorough investigation is prerequisite to sound decision-making, and to responsible participation in citizenship action related to environmental issues.

The final component of the skill development model, action training, seeks to develop individuals who are willing and able to select and use responsible citizen behaviors in environmental issue remediation. This component familiarizes learners with the methods of action at their disposal, and assists them in gaining skills with those actions. Moreover, responsible decision-making is developed as learners evaluate proposed actions with respect to the effectiveness of those actions, and with respect to the associated ecological and socio-cultural implications of those actions. Finally, learners are required to formulate a plan of action which they might utilize in response to the environmental issue under investigation.

Thus, in the skill development model, learners develop the abilities to gather and evaluate information about environmental issues, to make sound decisions regarding appropriate environmental maintenance and remediation, and to take action as responsible citizens in helping to resolve environmental issues. Because this is a developmental approach, it requires careful sequencing and sufficient time, and may not easily lend itself to infusion into existing curricula. The model does lend itself very well, however, to a team approach, where a science teacher, social studies teacher, and/or language arts teacher join forces, sharing the particular subject-matter expertise of each. This model also appears to promote the development of an autonomous individual, who is able and willing to practice responsible citizenship beyond the confines of the classroom (Klingler, 1980; Ramsey et al., 1981).

Conclusion

In summary, two viable models exist for dealing with environmental issues in the classroom. Both models have merit and both require teacher training for optimum effectiveness. It must be acknowledged that the skill development model requires more intensive teacher preparation than does the case study apprach. Similarly, the former may prove more difficult to infuse into particular settings than the latter. Of the two approaches, however, the skill development model holds the greater potential for acheiving an environmentally literate citizenry. In the final analysis, it remains for decision-makers in local educational settings to reach agreement concerning desirable educational goals, to select the instructional model which will facilitate the attainment of those goals, and to see to it that training is provided to teachers in order to successfully utilize the preferred model.

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RECENT WISCONSIN INITIATIVES IN ENVIRONMENTAL EDUCATION

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Wisconsin was one of the first states to establish statutory requirements for teaching about natural resources and their conservation. In the mid-1930's, "elements of agriculture and conservation of natural resources," were made part of the "fundamental course" of every public elementary school. Every high school was required to "provide instruction in ... conservation of natural resources." Other statutes were created which required "adequate instruction in the conservation of natural resources" of all candidates for licenses to teach courses in science or social studies.

The teacher certification requirement remains in the Wisconsin Statutes in its original form but its impact has been modified by the promulgation of an administrative rule. The elementary and high school requirements were subsumed in a 1985 statute dealing with educational goals. In this statute school boards are required to provide an instructional program which helps students gain a basic body of knowledge that includes "information and concepts in...natural sciences, including knowledge of the elements of agriculture and the conservation of natural resources,..." This unfortunate attachment of the conservation of natural resources to the natural sciences occurred with little or no publicity and an effort is underway to amend the statute involved. Hopefully the new language will use the term environmental education and stress the infusion of environmental content into all subject areas at all grade levels, with the greatest emphasis in structional programs in art, health, science, and social studies.

Since 1980, several initiatives have been undertaken which have greatly strengthened environmental education in Wisconsin. They include: (1) the promulgation of an environmental education requirement for about two-thirds of all teachers applying for initial certification; (2) the development of an environmental education curriculum planning guide; (3) the creation of a school district standard requiring environmental education curriculum planning; and (4) the creation of standards for secondary level teacher preparation programs in environmental studies.

Teacher Preparation

A teacher certification rule was officially promulgated by State Superintendent Herbert J. Grover on October 13, 1983. It requires that candidates seeking certification in the areas of early childhood, elementary, agriculture, science, and social studies education after July 1, 1985 be able to demonstrate competency in four areas of content and three areas of methodology:

- natural resource conservation;
- ecological principles;
- energy in physical and biological systems;
  - people-environment interactions including
  - a historical review of such interactions
  - human population growth problems
  - natural resource management
  - impacts of technology
  - effects on physical and mental health;
- techniques for using affective education methods to examine attitudes and values inherent in environmental problems;
- the infusion of environmental content into the curriculum, stressing methodologies such as:
  - outdoor teaching
  - simulations
  - case studies
  - community resource use
  - issue investigation;
- techniques for teaching about citizen participation in the resolution of environmental issues and problems.

The Curriculum Planning Guide

The development of a new publication, A Guide to Curriculum Planning in Environmental Education, was initiated in response to a recommendation contained in From Ought to Action in Environmental Education: A Report of the National Leadership Conference on Environmental Education.

This recommendation reads as follows:

> Recommendation 15: The Tbilisi goals and objectives of environmental education should be further clarified for use by teachers; mechanisms for achieving these goals should be identified to encourage environmental educators to utilize the environment in its totality and in all curriculum areas.

Work on the curriculum planning guide began in 1979, but was delayed by the effort to enact the new teacher certification rule. In September 1983, State Superintendent Herbert J. Grover appointed a task force to continue development of the guide.

The new guide is not a traditional curriculum guide, but a curriculum planning guide. It offers a rationale for environmental education, a suggested philosophy, a goal, five categories of environmental education objectives, and identifies the kinds of objectives appropriate for different grade levels. There are also sections dealing with environmental content, values education and the environment and approaches to teaching and learning. The guide emphasizes the infusion of environmental content into all subject areas at all grade levels. Curriculum planners are aided by sections dealing with the work of a local environmental education curriculum committee, current issues in enviromental education, and numerous appendices.

The characteristics of programs recommended by the guide include:

Holistic -- dealing with the natural, built, technological, social, economic, political, cultural, moral, and aesthetic aspects of environment;
Continuous -- part of all subject areas at all grade levels;
Interdisciplinary -- drawing content from all desciplines;
Issue-oriented -- dealing with issues having local, statewide, national, and international perspectives;
Globally-oriented -- considering Earth as a single ecosystem;
Future-oriented -- concerned about future as well as present generations;
Experientially -- utilizing a diverse array of learning approaches and environments; and
Action-oriented -- involving students in the resolution of real environmental issues and problems;
Neutral -- approaching issues and problems without bias, with the classroom considered to be a forum where all points of views can be heard.

The Curriculum Planning Requirement

The new curriculum planning requirement is part of a new school district standard which reads as follows:

> Develop a written sequential curriculum plan that includes language arts...environmental education...and music. The plan shall specify objectives, course content and resources, and shall include a program evaluation method.

An administrative rule interpreting this and several other school district standards directs the following approach in implementing programs to meet this standard:

> Environmental education objectives and activities shall be integrated into the kindergarten through Grade 12 curriculum plans of all subject areas, with the greatest emphasis in the plans for art, health, science, and social studies education.

This standard and its associated administrative rule will go into effect with the 1988-89 school year. A 20% stratified sample of school district will be audited on site each year. Districts judged not to be in compliance with this and/or other standards will be penalized 25% of their state financial aids.

Environmental Studies Certification

Although A Guide to Curriculum Planning in Environmental Education promotes the infusion of environmental content into all subject areas, it does not preclude high school environmental education courses if they meet certain criteria. They should:

- be elective and offered to students in their junior or senior year;
- not supplant or inhibit the infusion of environmental content into subject area curricula for the junior or senior year;
- stress the kinds of objectives recommended for these grade levels skills, participation, and attitudes;
- have a definite issue orientation, with specific issues to be studies identified by students and teachers working together; and include the study of at least one international, one national, and statewide, and one local issue;
- use both secondary and primary sources of information in the study of these issues; and
- be taught by an interdisciplinary team.

As a result of an other administrative rule, promulgated in the summer of 1986, teachers of such courses must be graduates of an approved preparation program which requires study:

- to develop an understanding of natural resources and their management;
- to develop knowledge of ecological principles and their application to the solution of environmental issues and problems;
- to develop an understanding of energy in physical and biological systems, and the environmental consequences of

energy use;
- of the history and philosophy of interactions between people and the environment;
- of the implications of continued growth of the human population;
- of how people/environment interactions affect physical and mental health;
- to develop the ability to plan and implement curricula utilizing cognitive and affective education methods in the study of environmental issues;
- of ways in which citizens can actively participate in the resolution of environmental issues and problems, and how such strategies can be incorporated into curricula and instruction; and
- to develop the ability to incorporate environmental content into traditional subject areas.

The development and implementation of these initiatives has depended and will continue to depend on the willingness of educators to heed the advice given by Aldo Leopold in discussing the resolution of environmental issues and problems:

> The usual answer to this dilemma is "more conservation education." No one will debate this, but is it certain that only the volume of education needs stepping up? Is something lacking in the content as well?

Educators in Wisconsin are attempting to increase the volume of environmental education, but even more importantly, to develop its content to prepare citizens who must deal with the problems of the 1980s and beyond. The teacher certification rule, publication of the new curriculum planning guide, the curriculum planning requirement, and the new secondary environmental studies certification standards are designed to help them do just that.

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THE HOLMES GROUP REPORT: A NEW CHALLENGE TO ENVIRONMENTAL/OUTDOOR EDUCATION

Dr. C. L. Shepard, University of Florida
Dr. V. M. Caruso, Kennesaw College

In April of this year a five-point plan was put forth by a group of university deans, known as the Holmes Group Consortium, to reform teacher education. In the report entitled Tomorrow's Teachers there is a call for extensive testing of teachers and perspective teachers and for an increase in the number of minorities in the profession. The reform of teacher education would establish a three-tiered teaching system, require teachers to obtain master's degrees, and create institutions whose main purpose is to conduct educational research.

The Group, named after Henry Holmes, former dean of the Harvard Graduate School of Education, represents approximately 40 research universities offering doctorates in education. It has invited more than 120 other universities to join the reform scheduled to be implemented at several institutions this fall.

The Holmes Group states in its Goals that changes are necessary to make teacher education intellectually more solid, to recognize and accommodate the differences in teacher's skills, to create more uniform entry standards that are professionally relevant and intellectually defensible, to connect colleges and universities to elementary and secondary schools, and to make schools better places for teachers to work.

The agenda for improving the profession calls for a change in teachers' assignments. The group is recommending that a differentiated structure be developed for teaching. The foundation of the pyramid is formed by an "instructor" or "novice" category. This level accomodates temporary teachers who are under the supervision of a certified professional. Instructors would hold liberal arts degrees, be required to pass a general test of writing and reading, and receive nonrenewable five-year teaching certificates.

"Professional teachers" - those capable of assuming responsibility in the classroom and in school administration - would occupy the next level up in the hierarchy. Entrance to this category would require a master's degree, continued study in the candidate's major and minor fields, studies of pedagogy, work with disadvantaged youth, and a full year of supervised teaching.

At the top of the pyramid would be the "career professional", highly competent teachers who have demonstrated a commitment to teaching. These individuals would function in a role similar to that of clinical professors of medicine. Entrance to this category requires completion of a doctorate in teacher education, demonstration of practical competence over a three- to four-year period, and written and oral exams in a range of areas related to their careers. Teachers in these top two categories would be granted tenure in much the same way as college faculty.

The Holmes Group Report also identifies changes required in universities and colleges to bring about the suggested reform. They suggest that undergraduate education degrees be abolished and replaced with improved master's degrees which include one year of a supervised teaching internship. They also suggest development of stronger courses in core subjects. Institutions will also be asked to replace generic methods courses with subject-matter oriented studies of teaching and learning.

Academic courses in other units of an institution would be strengthened by revising the undergraduate curriculum, organizing course requirements to provide an understanding of the disciplines and devising coherent programs that support advanced studies in the art of teaching.

Issues and Discussion

The Holmes Report claims to identify and analyze a problem and then proposes an approach or solution. The report does stress the complexity of both the problem and the response and suggests a valid, cohesive plan to upgrade teacher education and the teaching profession. Hopefully this can bring about a more equitable balance between the intellectual and social demands on teachers and the current low pay scale they are afforded.

Eliminating the undergraduate education major is a beginning toward improving the quality of teacher education. It provides for an increased depth of content - especially important in the sciences - for future teachers. This change can allow degree granting programs in ecology, environmental education, and outdoor recreation to attract more students to their units. For the individual units this means more credit hours taught which directly translates to available monies. Increased understanding of environmental workings can also lead to greater emphasis on these areas once the students are in place in the school systems. Implementation of this portion of the Holmes Group Report could provide environmental educators with the opportunity for major societal impact.

There are, however, segments that need further discussion as they may affect our own teacher preparation programs, school systems, and environmental and outdoor education curricula. These concerns include philosophical considerations, curriculum implications, and implementation factors.

Philosophical Considerations

Elitist

A major vocal concern leveled about the Holmes Group is that its operating style is perceived as elitist, using a "top-down" hierarchial management style. The fact that this report was developed by research institutions and invitations to join were offered to other "powerful" but not necessarily "model teacher education programs" generates feelings of exclusion and elitism.

One Model

A second concern in this section deals with the model. The Group emphasizes that this is THE needed reform model for teacher education--thus, suggesting that there is only one model/method for adequate teacher education. Are there other equally effective models?

Change Schools

The language of the report stipulates that schools and curricula must be changed to make them more compatible to the proposed requirements. The committee constantly asks for changes to meet teachers' needs. What happened to our concern for the learners' needs? In addition, the roles of school principals are not clearly defined. They play a major role in the climate of the work place. Does the Holmes Report adequately address school structure as it relates to learner achievement and climate of the workplace?

Curriculum Implications

Knowledge Equals Transition

According to the report, the undergraduate curriculum concentrates on obtaining depth in content knowledge. The more content school teachers have about a discipline the assumption follows that the teaching and curriculum in the school will be better. By having a strong undergraduate major in a discipline, will the prospective teacher teach better? Will teachers be able to better integrate their areas with others in the curriculum?

Because a teacher has more knowledge of subject matter, will coursework standards and materials improve and increase? In secondary English were not the basics slighted by teachers who wanted advanced courses which were more exciting or interesting to teach? How much more can be put into a natural resource management course at college or the one-week environmental science unit at the secondary school level without causing "learner burnout?"

Evaluation of Teaching

The Group indicates an emphasis on standards and improving the knowledge of teachers and its evaluation. Some teaching skills can be easily and objectivley measured, i.e. actual learning time or class organization. Others have subjective measurement techniques, i.e. enthusiasm, student-teacher interactions, caring and commitment. Are these not important?

Rigid Standards

The report chides teachers and school systems as too rigid and passive. However, it suggests the need for further and more specific standards and controls. Once education adopts something, how quickly and readily does it change? Many of us are still using basic technology while businesses are on fifth generation computers. How many of us are using laser disk technology to demonstrate time lapse photography or compact discs to learn and recognize nature sounds?

Liberal Arts Education

Baccalaureate education as we know it today will be an anachronism. We will prepare liberal arts majors with a specific discipline thrust. Is environmental/outdoor education a distinct and viable discipline, a method or a part of science, recreation or some other discipline? Presently the Holmes Report does not mention environmental or outdoor education.

Commitment and Evaluation

With adoption of the report an undergraduate liberal arts major can become a temporary instructor and may teach under supervision. However, what type of supervision will be provided? With the number of teachers currently in our country, how will adequate supervision and evaluation be performed? Also, will these "temporary" teachers have a commitment to teaching or only maintain a job for a few years until one in their discipline is available?

Implementation Factors

Vague Procedures

If an invited institution does join, the annual membership fee is $4,000. Institutions, by joining, must agree to implement the goals and objectives of the report. However, there is no blueprint for adherence--only general ideas. The Group announced that its focus over the next five years is to identify the implementation plan. At present, institutions are joining without specific procedures.

Faculty Classifications

The Group identifies the faculty at research institutions as the most qualified to train teachers. It announces that the present quality of their program is not a factor in the invitations to institutions. Are research faculty, many of whom have spent years away from the classrooms or have been trained under "traditional" programs, the best to perform these tasks?

Public Funding

The Homes Group is suggesting a model for education whcih is based on the medical model. However, not only are we noting changes today in the medical model, but there is a major difference. Do hospitals have to negotiate their funding sources with the public as education does?

Minority Recruitment

The Holmes Group suggests that this model will attract more minorities. At present, the number of minorities entering for the baccalaureate degree is down. What in this model will encourage them to seek careers where a masters degree is required?

The members of the Holmes Group have worked hard to produce a statement that is sometimes innovative and occasionally thoughtful. Unfortunately, they tried to do too much, too soon. And, they left us with too many incomplete recommendations. It is the responsibility of each of us to identify if this is the best approaching and become active in shaping our future.

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REDUCING BARRIERS TO ENVIRONMENTAL EDUCATION

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It has been widely reported that the progress of environmental education (EE) in public schools has slowed (e.g., Pettus and Teates 1983, Trent 1983, Troy and Schwaab 1982). In response, teachers in-service training in EE has proliferated. Commonly, these efforts have been activity-oriented, focusing on providing teachers with instructional materials, activity guides and, related information on teaching methods. This approach appears to assume the major barriers to EE are lack of instructional materials and teaching know-how. However, recent research shows that other important barriers may exist.

Results of a study by Sewing (1986) revealed four broad categories of barriers:

1) Conceptual--barriers stemming from lack of consensus about the scope and content of EE;
2) Logistical--barriers stemming from a perceived lack of time, funding, instructional resources, suitable class sizes, and so forth;
3) Educational--barriers stemming from teachers' misgivings about their own competence to conduct EE programs; and
4) Attitudinal--barriers stemming from teachers' attitudes about science and EE instruction.

An enigma in Sewing's data was that respondents apparrently had very positive attitudes towards EE, yet almost half conducted EE discussions or activities only "now and then." In other words, teachers' attitudes were not reflected in their actual behavior. Thus, attitude did not itself appear to be a barrier to conducting EE.

Based on Sewing's findings, one of her major recommendations was that EE in-service workshops should specifically focus on eliminating or reducing known barriers to EE. She argued that removing or reducing these barriers would facilitate greater attention to EE in public schools. The purpose of the present study was to test this contention by designing such a workshop and evaluating its ability to accomplish the following objectives.

Workshop Objectives

Reduce Conceptual Barriers

1) To decrease the number of teachers who perceive EE strictly as outdoor education (i.e., emphasizing outdoor skills, techniques and activities).
2) To decrease the number of teachers who perceive EE strictly as science education (i.e., emphasizing traditional science topics such as biology, botany, zoology and so forth).
3) To increase teachers' perceptions of EE as being multi-disciplinary (i.e., including EE in subjects beyond the usual science curriculum), and interdisciplinary (i.e., integrating more than one subject at a time).
4) To increase the number of regular school subjects teachers include in EE activities.

Reduce Logistical Barriers

5) To increase teachers' knowledge of where to obtain EE instructional materials and personal assistance.

To decrease the importance to teachers of
6) lack of teaching time,
7) lack of preparation time,
8) lack of funding, and

9) class size.
as barriers to conducting EE.

Reduce Educational Barriers

10) To decrease the perceived importance of a strong science background to conducting EE.
11) To increase the number of teachers who feel they have an adequate background for conducting EE.

Increase EE Activity

12) To increase the number of teachers voluntarily conducting EE activities.

Description of Workshop

The workshop was held on October 3 and 4, 1985, in Moscow, Idaho. A town setting was chosen over a remote camp setting to emphasize that EE can take place in or near schools, eliminating the need for costly field trips and transportation. The workshop was planned for elementary school teachers, although other interested people were welcomed. Enrollment included 60 teachers, 21 University of Idaho students, and 6 other people. The workshop was sponsored by the University of Idaho Department of Wildland Recreation Management and the U.S.D.A. Forest Service, Idaho Panhandle National Forests. Both provided technical assistance and personnel free of charge which allowed participants' costs to be kept to a minimum. Publicity and other assistance was also provided by Idaho's State Department of Education.

The workshop program consisted of a series of talks and hands-on activities through which a variety of ideas and EE materials were presented. Each person making a presentation was asked to focus on specific workshop objectives. Table 1 lists the major presentations, the time spent on each, and the corresponding objectives. Participants were given a notebook of workshop materials which included additionial EE references, resources and materials. Notebook materials were selected to augment workshop objectives.

The workshop concluded with a planning session to prepare participants for a credit assignment. The assignment required teachers to plan and lead two hours of EE activities with their students using one or more of the packages of materials they had learned about through the workshop. At least one activity was to include more than one subject area and all activities were to include a nonscience subject. The purpose of this assignment was to encourage teachers to try out the materials they had learned about--to make the step from the ideological workshop setting to the reality of the classroom. Assignments were due in five weeks.

Evaluation Procedures

Because the intent of the workshop was to reduce barriers to EE for teachers ,only teachers were included in the evaluation. Accomplishment of the workshop objectives was determined using a quasi-experimental, separate-sample pretest-posttest design (Campbell and Stanley 1963).

Table 1. Major workshop presentations, their length, and objectives to be emphasized

Presentation	Length	Objective Number[1]
What is Environmental Education and What Should It Do?	40 min.	1,2,3,4
What is *Project Wild*?	40 min.	1 through 4,10,11
Environmental Education: You Can Do It!	30 min.	10,11
Project Learning Tree Certification	6 hours	1 through 11
The State of the Environment: The Need for Environmental Education	1 hour	3,4,10,11,12
The *Investigating Your Environment* Series	2 hours	1 through 11
Getting Students Involved through *OBIS* (Outdoor Biological Instructional Strategies)	1 hour	1 through 11
Environmental Education Potpourri	1 hour	5,6,7,8
Planning Session and Assignment for Credit	1 hour	12

[1] Refer to workshop objectives in Table 2.

The pretest and posttest surveys were designed and implemented using Dillman's (1978) Total Design Method. Each survey question addressed one or more of the workshop objectives (see Table 2).

The pretest instrument was administered during workshop registration to 30 randomly-selected teachers who were asked to complete the survey before workshop sessions began. Posttest surveys were mailed out ten weeks after the workshop. This late date was chosen so that data could be collected on the number of respondents voluntarily conducting EE activities subsequent to the workshop and after the assignments for credit were due. The survey data were analyzed using SPSSx (SPSs, Inc., 1983).

Table 2. Survey questions and corresponding workshop objectives

	Survey Question		Workshop Objective
1.	Define environmental education in your own words.	1.	To decrease the number of teachers who perceive environmental education as outdoor education.
		2.	To decrease the number of teachers who perceive environmental ducation strictly as science education
2.	Did you conduct any environmental education activities between September 9 and October 2 (November 9 and December 13 for posttest) of 1985?	12.	To increase the number of teachers voluntarily conducting environmental education activities.
3.	(If answered "Yes" to 2): What regular school subjects, if any, were included in each activity?	4.	To increase the number of regular school subjects teachers included in environmental education activities.
4.	What subjects could be included in an environmental education activity?	3.	To increase teachers' perceptions of environmental education as being interdisciplinary and multidisciplinary.
5.	Do you know of any organizations or persons that can provide you with curriculum guides, instructional materials, or personal assistance? (Please answer separately for organizations and persons.)	5.	To increase teachers' knowledge concerning where to obtain environmental education instructional materials and personal assistance.
6.	Do you know how to obtain the following environmental education packages or materials?	5.	Same as above.
7.	How important could each of the following be in preventing you, as a teacher, from conducting environmental education?[1] 1. Lack of funding. 2. Class size. 3. Lack of preparation time. 4. Lack of teaching time. 5. Lack of a strong science background.	 6. 7. 8. 9. 10.	To decrease the importance to teachers of: Lack of teaching time, Lack of preparation time, Lack of funding, Class size, and A strong science background as barrier to conducting environmental education.
8.	Do you feel that you have an adequate background for conducting environmental education?	11.	To increase the number of teachers who feel they have an adequate background for conducting environmental education.

[1] A six-item, Likert-type scale ranging from "Extremely Important" to "Not Important" was used to rate each item.

Results and Recommendations

Based on the findings of this study, conclusions can be drawn concerning the effectiveness of the workshop in reducing barriers to EE:

1) The workshop was able to reduce some of the conceptual barriers to EE . The workshop led to an increase in teachers' perceptions of EE as being interdisciplinary. In addition, it also led to an increase in the number of regular school subjects teachers included in EE activities. However, although teachers did not perceive EE strictly as science education before or after the workshop, science emerged as the prevalent curriculum areas for EE both before and after the workshop. Neither before nor after the workshop did teachers perceive EE as being strictly outdoor education.
2) The workshop was able to reduce some of the logistical barriers to EE . The workshop was able to increase teachers' knowledge of where to obtain EE instructional materials and personal assistance. It was also able to reduce the importance of lack of funding as a barrier to EE. However, the workshop was unable to reduce the importance of lack of teaching time, lack of preparation time, and class size as barriers to EE.
3) The workshop was able to reduce the educational barriers to environmental education .
4) The workshop led to an increase in the number of teachers voluntarily conducting EE activities .

Thus, an EE in-service workshop can lead to the reduction of many of the barriers which inhibit teachers from conducting EE. Additionally, results of this experiment indicate the when such barriers are reduced, attention give to EE by classroom teachers is likely to increase.

Based on the results of this study, we suggest that future workshops hoping to reduce barriers to EE could improve upon this workshop by presenting more EE materials which place less emphasis on science, and by providing teachers with time, materials, and the assistance of curriculum writing specialists to help the teachers incorporate EE into their present curricula. Small-group "brainstorming" sessions among the teachers on possible ways to overcome some of the barriers to EE may also be beneficial.

Notable, results of this study point to the importance of systematic approaches to identifying ways to improve teacher in-service training. Although a continual need exists among teachers for information on EE activities and materials, empirical research has identified other kinds of barriers not typically addressed by in-service workshops. The potential significant benefits of applied research in EE are underscored by the fact that identification of these barriers led eventually to an increase in EE activity by a target population of school teachers.

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DESIGNING INSERVICE PROGRAMS USING INTERACTIVE LASER DISK TECHNOLOGY

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This project focuses on the design of a teacher inservice program on groundwater education. It was developed using a hardware configuration consisting of a laser disk player, a 13 inch video monitor, and a Macintosh microcomputer with interface cables. In designing this courseware Edudisc's authoring system entitled Mentor and Edudisc's Macvideo, a laser disk editing program, were used. In addition to demonstrating the inservice on groundwater, this presentation focused on explaining the application of this approach to course design and on the feasibility of using this technology in designing inservice programs for teachers.

The development of this interactive video disk inservice program was part of a groundwater demonstration in McMinn County, Tennessee conducted by the Tennessee Valley Authority's Office of Natural Resources and Economic Development. The objectives of this program were to organize a local groundwater steering group, educate the public about groundwater, conduct a survey of public groundwater supplies and major springs, map recharge areas, and map geologic structural controls to groundwater movement. Furthermore, the educational component focuses on interactive courseware as an alternative to traditional inservice programs for middle grade teachers. In addition, students were involved in school-based programs on groundwater and in field activities such as an abandoned well survey and in groundwater sampling techniques.

A formal student orientation to the program was conducted during Spring 1986. A traditional teacher development program on groundwater instructional resources and a demonstration of laser disk technology was scheduled during a teacher inservice program in August; 1986. The teachers expressed a high degree of interest in exploring the uses of interactive laser disk technology.

The interactive program on groundwater will be made available for teacher use during the Fall of 1986. This program consists of the following components:

--An introduction to the courseware package including the goals and objectives of the program. This section emphasizes the use of the text format in interactive courseware.

--The identification of central themes on groundwater and the selection of specific student groudwater activities. This section illustrates the use of the excursion format as a means of branching from topics to subtopics.

--Instruction in the groundwater concepts underlying the selected laboratory activities. The text, multiple choice, and fill in the blank formats of the authoring language will be used in this section of the courseware. Graphic displays on the monitor screen and laser disk images are featured in this section.

--An evaluation component intended as a self-check to be used by teachers in assessing their understanding of the concepts of the lesson. This section can also be used by teachers in preparing an evaluation component for the instructional activities on groundwater. It will also demonstrate a feature of Mentor that allows the course developer to quantitatively evaluate overall performance of all those taking the course--in this case evaluation component of the courseware.

The courseware on groundwater was organized around a student activities booklet compiled by Cedar Creek Learning Center (1985). The visuals used were selected from a slide/tape program developed by Schuhart and Schuhart (1984). Macintosh computer screen images incorporated into the courseware materials were based on the American Institute of Professional Geologists' (1983) publication on groundwater. An evaluation of the effectiveness of the developed courseware as an alternative to traditional inservice education as well as an assessment of the general applicability of this approach to designing inservice programs will be conducted during the 1986-87 academic year.

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TEACHER EDUCATION IN ENVIRONMENTAL EDUCATION: CHALLENGES IN AN INFORMATION AGE.

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The problems of the environment are indeed complex ones. They involve numerous parameters and interrelations. Lacking the necessary knowledge and approaches, individuals admit defeat and hand the

> problems over to the specialists. It is in terms such as these that recourse to technology is frequently justified. The ordinary people, who come to be regarded as mere operatives or consumers" (UNESCO, 1980).

Much has been written about technological development in information generation, handling, and dissemination. Less, it seems, has been written about the meaning and significance of such developments (Wartella, 1980). The information age offers access to an increasingly complex array of knowledge; it also offers greater opportunities for individuals and corporations to organize and control access to knowledge in a way that adds to the power of their operations. With the information age comes the opportunity for co-optation of knowledge. As one commentator on information technology puts it:

> "The advent of new technologies...are never hard-edged events. As they emerge, their form and meaning, and their structure, organization, and use, are open to experimentation, to change, and to co-optation." (Schiller, 1983)

Schiller also points to the disturbing increase in privatization of knowledge -- the reworking of the notion of information from one of social good to one of private and hence saleable, exploitable commodity:

> "While the current era is often characterized as an "information age," a more appropriate designation would take note of the fact that the privatization and commercialization of information now have become the distinguishing practices of domestic information exchange. This development is changing the way information is being viewed and handled." (Schiller, 1983)

The point being made here is that with the information age comes an information technology; systems of information management that create the conditions for some individuals and groups to gain relatively greater control over knowledge than others. The paradox we face is that the information age may be disenfranchising us as much as it is improving our liberty: whereas an increase in available knowledge ought to improve the rationality of our actions, an increase in a bureaucracy of information may actually diminish the rationality of our actions. In a paper addressing this issue in the field of distance education, Kemmis (1980) deprecates our willingness to subjugate our critical human intelligence to what he calls "technologies of reason":

> in a world dominated by contending specialisms, arcane technologies and the proliferation of mass solutions to practical problems, we seem all too ready to give up our own critical intelligence and to accept as the solutions of our own problems the forms of life fashioned for us by others -- where those "others" are "experts", "specialists" or... the technologists of reason.

In environmental education, as in all forms of personal and professional development, we need to adopt a critical outlook aimed at identifying the efforts of others to shape our social and environmental values. In light of the warnings of Schiller and Kemmis, the comments of Buzzati-Traverso, who was Senior Scientific Advisor to UNEP and key figure in the UNESCO-UNEP Program in Environmental Education in the mid-'seventies, are even more relevant in the information age of the mid- 'eighties. When addressing UNESCO's Belgrade Conference, Buzzati-Traverso spoke of the importance for environmental education of recognizing the multiplicity and roles of "social values" and "competing ideologies" in education:

> At any one time, the educational system -- whether based on religious dogmas and practices or on rational thought -- has tried to divulge, sustain and perpetuate sets of social values. The process has occurred sometimes openly, at other times through devious channels. If you consider the world today and examine the diverse educational systems, you can clearly identify competing ideologies: those which are attempting to hold on to recognized and almost undisputed values, and those which have launched a major strategy for conquering the world of men's (and women's) minds. In other terms, behind any educational process lies a philosophy, a moral philosophy, for the people who exert power and are in charge of educational institutions share certain values, which they wish to disseminate in order to ensure the prolongation, if not the indefinite survival, of the system they are devoted to (Buzzatti-Traverso, 1977).

A philosophy similar to Buzzati-Traverso's is discernible in some of the rhetoric emerging from the nest landmark event in the UNESCO-UNEP Environmental Education Programme, the intergovernmental conference at Tbilisi:

> Environmental education should not confine itself to disseminating new knowledge but should help the public question its misconceptions concerning the various problems of the environment and the value systems of which these ideas are a part... All decisions regarding the development of society and the improvement of the lot of individuals are based on considerations, usually implicit, concerning what is useful, good, beautiful and so on. The educated individual should be in a position to ask such questions as: Who took this decision? According to what criteria? With what immediate ends in mind? Have the long term consequences been calculated? In short, he (she) must know what choices have been made and what value systems determined them. (UNESCO, 1980)

In environmental education in this information age, then, it is particularly important to adopt the approach of inquiring critically into the environmental, educational and social values informing environmental, educational and social actions when and where required, rather than to simply adopt the approach of emphasising the acquisition and retention of information of an alleged universal type; on information drawn from the stockpile of "objective knowledge" collected by others. This paper will argue that to achieve this aim, environmental education in an information age requires a paradigm shift in the areas of pedagogy and teacher education; a shift from a paradigm of "information technology" to a paradigm of "information critique". A perspective on the form of this paradigm shift in the particular field of teacher education in environmental education is the subject of this paper.

Some of the environmental education issues addressed in the paper are: (1) what view of teacher professionalism tends to be expressed in the "information technology" paradigm of teacher education? (2) why is participant research by teachers important in the "information critique" paradigm of teacher education? (3) in the "information technology" paradigm, how is the educational problem posed by environmental education construed? (4) in the "information critique" paradigm, what is an appropriate role for conference in EE?

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STUDENTS LOOK AT THE YEAR 2010

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The observations which will be made in this presentation come from the author's experience of the last seven years in teaching courses, variously titled, which deal with the prospects for the U.S. and the world by the year 2010. The courses have been offered primarily for university undergraduates, but have also been offered in modified forms to groups of students in high school programs for the gifted; to international students; and to groups of older persons. They are taught as a consideration of the intersections of the technological, environmental, and political trends and possibilities which exist or are emerging in the late 20th century. The year 2010 was selected as the "target" year because it is near enough in the future that today's students will be in their early middle years, and far enough in the future so that significant changes can have occurred.

The major assumption of the instructor is that most people have an image of a future. It may be vaguely-realized, but it exists and is important because people tend to move toward this image, and to structure their actions in accordance with their assumptions about what the future will be. Therefore, it is important to help people articulate their visions, and then to examine them to see if they are desirable ones--for the individual and for the world. The instructor has found, in working with the various groups named above, that there is a remarkable consistency among these groups on what the major trends are likely to be, although a different interpretation of what these mean.

In working with two groups of gifted high-school students, the first exercise was to ask them to complete the sentence "When I'm 40 I expect to be..." The results, from 200 students in a special magnet high school for science and technology, were presented, along with the results of a second open-ended question, "In my opinion, if present trends continue, the world of 2010 will be more (----) and less (----) than it is in 1986." Students uniformly expressed optimism about their own prospects for success, wealth, and happy family life, while indicating that the state of the world could be expected to be heavily technological, overpopulated, and environmentally degraded and polluted. However, they did not see these problems as having an impact on their own lives, nor did they expect to focus much of their efforts on these problems, believing that it would take a clear and visible crisis in order to call forth solutions from government.

University students in the instructor's sophomore-level course have been asked the same question over the past seven years. Their responses to the open-ended question on the trends which will shape the year 2010 have been much the same: they see it as being a heavily technological and computerized world, with a much larger population, and with significantly more pollution. While in the early 1980's, they believed that these problems would severely impact upon their own lives. In more recent years they have expressed a level of personal optimism similar to that of the high school students, believing either that their own success in their projected careers will enable them to escape the worst manifestations of overcrowding and pollution, or that crises will engender an appropriate technological response.

When the same open-ended question was proposed to a group of international students, mostly Africans and Asians enrolled in graduate programs in agriculture, engineering, and other professional schools, the response to the open-ended question on trends shaping the year 2010 was identical, or nearly so. They indicated their belief that the world would be more technological and computerized, more populated, and more polluted, but many added "if it's there at all." Ensuing discussions and conversations indicated a general belief that the superpowers, the USA and the Soviet Union, held the destiny of the world's peoples, and that the likelihood of war between the two was rather high. An overwhelming concern of participants was in the matter of widespread world hunger, an area in which they believed the superpowers also had a role and a responsibility because of the ways in which western-style capital-intensive models of agriculture and industrial development had been imposed on newly-independent countries. Participants expressed a desire to take the best of the western technology and methods back to their countries of origin, but to use them in a more discriminating manner than has been the practice of the last thirty years.

In summary, there appears to be general agreement among student groups on the comparative importance of the trends that are unfolding, although some disagreement over the implications of the trends and about whose responsibility it is to alter trends which are not moving in desirable directions. American students, with whom the remainder of these comments will be primarily concerned, express a strange dichotomy in terms of their own sense of power over these trends. They tend to see the world as becoming more technological and to see this as representing a triumph of human will and ingenuity--we have the capability to produce whatever's needed if the need is clear enough; there's nothing that can't be done if we make enough effort and work together. But they also see the world as becoming overpopulated and environmentally deteriorated and express the belief that this is beyond their powers to alter--it will continue to happen until some powerful institution (government) decides to take action. Their own capabilities are not sufficient to cope with problems of this magnitude.

If, as is assumed, people tend to move toward the image of the future which is most vivid in their minds, the image toward which we appear to be moving--technologically dominated, hugely populated, environmentally degraded, and at the mercy of forces other than those which offer individual choice--may have been best depicted in the recent film Blade Runner, which students have agreed is a rather accurate extrapolation of these trends. The purpose of the "Year 2010" course is to help students develop and visualize alternative images which are more positive and, most importantly, to help them to formulate which choices they can consider making now in order to move toward this positive image. As the course is offered from a program in Urban Affairs and Planning, the emphasis is one attempting to find which types of urban living environments should be encouraged today in order to maximize the chances of a livable world of 2010. Students are asked to consider what their own choices of housing, transport, energy systems, leisure time activities, etc., might be. They are asked to find the best and most desirable technologies which are compatible with their desire for environmental sustainability; they are also asked to determine what changes in their own patterns of consumption can be made.

An important part of the course is involved with helping students to determine their own criteria for a world of 2010, and the characteristics of the world they want to see and for which they are willing to work. Each student is required to develop these criteria and to sign a statement indicating that these are standards for which they are willing to work. The final course project is their own development of a fully-realized image of an urban neighborhood in the year 2010 which is based on these criteria.

STRATEGIES FOR SEQUENCING ACTIVITIES IN WEEKLONG EE WORKSHOPS FOR ATTITUDINAL CHANGE

Kay Monroe Smith
Loyola University of Chicago

Environmental educators can sequence activities in weeklong workshops to foster participants' attitude change. As group facilitators they can use sequencing principles for all workshop phases: conducting a needs assessment and audience analysis, selecting and training a workshop team, researching and delineating content, planning and scheduling learning activities, presenting and coordinating participants' involvement, evaluating and planning followup. Participants in this session will review a variety of perspectives, case studies, methods, materials and hands-on experiences for sequencing environmental education activities for attitudinal change.

INCORPORATING EE INTO PRE-SERVICE TEACHER TRAINING

Darleen Stoner
California State University at
San Bernardino

Ways that environmental education has been included in pre-service teacher education will be reviewed. These include using Project WILD, modifying presentations and assignments, and providing a brief outdoor school experience.

REFLECTIVE TEACHING: CREATIVE WAYS TO EXPLORE AND IMPROVE THE QUALITY OF TEACHING/LEADERSHIP

Carolie Sly
Alameda County Office of Education
Hayward, CA

Participants will learn techniques, such as drawing conceptual maps, breaking mindset, and using metaphors to further develop the ability to reflect upon professional growth. Emphasis will be on exploring teaching/leadership styles on an ongoing basis. Especially useful for the beginning environmental educator and/or the supervisor.

Higher Education
and the
Non-teaching Professions

RECRUITMENT OF MINORITIES INTO NATURAL RESOURCES AT THE OHIO STATE UNIVERSITY

Mary Lynn Bowman
Environmental Education, The School of Natural Resources
The Ohio State University

Blannie E. Bowen
Environmental Communications and Agricultural Education
The School of Natural Resources and The College of Agriculture
The Ohio State University

For the past four years, the School of Natural Resources at The Ohio State University (OSU) has been actively involved in a minority recruitment program. In 1983, the U.S. Forest Service granted seed money to the school to work cooperatively on a resident program to introduce selected minority students to career opportunities in natural resource areas including environmental education, fisheries and wildlife management, forestry, parks and recreation administration, and natural resource development. For this initial project, high school senior minority students from two University Upward Bound Programs participated in a three day camp-like resident experience. Research utilizing a pretest-posttest control group design was conducted to assess the effectiveness of the venture.

Results indicated no significant difference in cognitive, effective and stress levels between the experimental and control groups prior to the experience; however, the minority or experimental group showed significantly greater positive gain as a result of the experience. In addition, positive results on a questionnaire/survey type instrument indicated that once minority students were exposed to opportunities in natural resources, they viewed careers in these areas as viable choices; however, most were high school graduating seniors and had already made their higher education decisions.

In the fall of 1984, the School received an affirmative action grant from OSU to build on the U.S. Forest Service Project. The following minority recruitment programs were initiated:

1. A slide tape program and brochure were developed for use in schools to introduce career opportunities in natural resources to biology teachers, counselors, and high school minority students. These materials were developed to appeal to urban youth. A modernistic brightly colored logo was designed to coordinate all recruitment materials. Urban job opportunities were stressed.

2. A resident natural resources educational experience was conducted in the spring of 1985 for 13 minority sophomore and junior high school students. A 25 item resource instrument was administered prior to and following the experience to determine whether there was a change in knowledge and attitudes about the environment. Additional background information about the participants was collected through a ten-item open-ended questionnaire.

Responses were used to indicate a general tenor of the experience and allow for unrestricted participant response.

Responses for each question on the resource inventory were coded using Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1, and Don't Know=0. The scores for both the pretest and posttest were tabulated and subjected to a t-test for significance. Only two questions recorded no change between pre and posttest scores. In the other 23 questions, the change -- although not statistically significant for all cases -- indicated a positive environmental response. Questions with the most significant positive changes addressed profitable employment opportunities available in natural resource career options, the use of fire as a natural resource management tool, and clear cutting to increase wildlife habitat.

Response by participants to the open-ended questions on the survey questionnaire unanimously reflected a positive experience. All of the participants were anxious to know if they would be able to return for another experience. This response and the general positive change in scores suggests that the experience was successful in impacting the knowledge and attitudes of these individuals.

3. A scholarship program for minority students was established in the School of Natural Resources. Currently, two undergraduate and four graduate students are receiving financial assistance through this program.

4. A cooperative employment program with natural resource agencies throughout Ohio was initiated to enable qualified minority students to receive a salary and work experience in positions related to their expressed career goals.

5. In the fall of 1985, a School of Natural Resources Open House was held to discuss career opportunities with freshmen minority students who were undecided about a college major. Faculty and students in each program area within the school presented brief introductions to required coursework and career opportunities. Although the program was designed to attract minority students, only 10% of the 77 students who attended were minorities.

In the spring of 1986, The School of Natural Resources held a career rap session for the students who had participated in the Spring 1984 resident experience plus additional interested high school minority students and their parents. Thirty-seven minority youth and their parents attended. The format was similar to the open house held in the fall and was expanded to include representatives of the OSU Office of Minority Affairs, the five student organizations within the School of Natural Resources, and informal discussions revolving around campus life in general. Administrators and faculty from all areas in the School were present for informal discussions following the formal presentations. Lunch and a tour of Natural Resource classroom and laboratory facilities concluded the program. Although it is too early to assess the effectiveness of this program, comments from the participants and subsequent visits by some of the participants to the School office for counseling indicate a high level of interest was sparked by the program.

Future Minority Recruitment Plans

The School of Natural Resources was notified in July 1986, of a second affirmative action grant award to continue its minority recruitment efforts. Monies have been provided to conduct a workshop during the summer of 1987 for 40 academically talented minority students on The Ohio State University campus. The one-week intensive study about natural resources and career options will feature minority professionals in natural resources and faculty within the school as teachers and role models. The participants will be selected from urban areas where their contact with the natural environment is limited. This workshop will offer the students opportunities to explore natural resources and get a realistic picture of career opportunities. Participation will be targeted at rising juniors in high school. This approach offers the students a unique advantage because they will have two years remaining in high school to take the appropriate foundation courses in the sciences, mathematics, communications, and other areas needed to perform at a high level in natural resources education programs.

Further, since the students will participate in a variety of instructional activities, they will have the opportunity to learn first-hand from individuals they can expect to have as college professors. This early exposure should remove some of the barriers commonly found between new students and their professors. This realistic look at college life and natural resources will include laboratory facilities on the OSU campus, land laboratories in the Columbus area, and other field-based experiences in surrounding counties. The workshop will be significant in another respect in that it will be an attempt to enhance positive or change negative and/or neutral attitudes minority students have about natural resources.

Additionally, a series of open houses and seminars for workshop participants and other minority youth and parents will be held throughout the 1986-87 school year. These will hopefully open and continue lines of communication between the School of Natural Resources faculty and staff and prospective students.

Discussion and Observations

Perhaps the major problem faced in natural resource recruitment programs is the lack of role models in natural resources professionals, faculty and students. It is difficult to attract minority students into areas where they are traditionally under-represented.

High school counselors in high minority population schools are not informed about natural resources and career opportunities. Minority parents likewise do not consider natural resource professions as career options for their children. There appears to be much more interest generated in social work, computer science, medicine, and law than there is in natural resources. Additionally, the media portray professionals such as doctors and lawyers, but natural resources opportunities are seldom if ever shown--at least in a positive and realistic manner. When natural resource professionals are portrayed, they are usually a "Smokey the Bear" or "Forest Ranger" image and are not attractive to urban youth.

Natural resource faculty and professionals are often their own worst enemies. They tend to focus on projects and programs conducted in a natural setting. The natural environment is out of the realm of experience of minority youth who are primarily urban dwellers. Natural resources occupations must be more realistically defined and demonstrate the urban perspective. Management positions need to be stressed because individuals who are professionally trained in natural resource areas should aspire to top level management jobs. Ways in which high technology including computers are utilized in natural resources should also be demonstrated.

Emphasis needs to be placed on the fact that natural resources are such a large part of all people's daily lives and minorities should and need to be included as decision makers regarding the management of natural resources.

In the course of establishing a natural resource identity, we need to be careful not to isolate ourselves from the rest of the university. Both prospective students and parents need to be reassured that a major in natural resources will not isolate them from other university students, programs and social activities.

Big is not necessarily better. Recruitment efforts are more effective when they direct individuals' attention to the needs of both prospective students and their parents. Small group informal discussions have proven to be more effective than large lecture presentations.

The high school senior year is generally too late to encourage students to consider natural resources career options. Most college bound minority students have made college and educational program choices during their early high school years. Recruitment efforts should focus on high school freshmen and sophomores.

Retention considerations are of equal importance when working with minorities. Minority students do not need special academic considerations, but they do have special needs that may be different from the traditional natural resource student. Faculty need to be trained and sensitized to these needs. The combination of being a minority and embarking on a nontraditional educational program can be very frightening as well as discouraging, particularly on a large campus as diverse as OSU. Faculty must be aware of this situation and willing to help the minority student through this adjustment period.

Recruitment efforts put forth by the School of Natural

Resources are beginning to yield results. During the 1984-85 academic year, one minority student was enrolled as an undergraduate in the School. This past year, there were five minority undergraduate students enrolled. Although the number is not that staggering, it represents a substantial increase. The School is committed to continuing minority recruitment efforts and is aware of the fact that programs must be aggressive yet sensitive to the minority perspective.

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BLEND STUDENTS, COMPUTERS AND EMERGING SOFTWARE IN THE ENGINEERING CLASSROOM: CAN WE CREATE A SUPERIOR LEARNING APPROACH?

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It is an accepted goal at UCLA to make computers an integral part of the curriculum, utilized wherever they can speed learning or expand understanding and ultimately better prepare for a career. It is expected that within the next several years it will become routine for all students to prepare reports using word processing and computer graphics, to do design and project economics calculations using spreadsheets, and to use mathematical models on the computer in lieu of substituting numbers in accepted, basic equations.

This change places a considerable learning burden on faculty. Engineering faculty typically have used computers for serious work throughout their careers. However, in the past most use has been through research and work with advanced graduate students following years of focused preparation. The world of computer use has been exclusive, peopled by specialists, and has utilized mainframe computers operated by a helpful staff of experts. Today's microcomputers are accessible to everyone and provide computing power in excess of mainframe capability just 20 years ago.

To permit students to simply enter a few keystrokes, however, and with a carefully prepared program compute the perfect answer to a stock problem is not sufficient. Our goal is to use computers as more than cheap, speedy slaves (though they are that). Given a problem to be solved, we want students to work with the computer in an interactive mode. Software will be provided which illustrates solution of some representative version of a real problem. Each student will be expected to select from reference sources the original data fitting a comparable new problem assigned to them. They will then work with the software provided, needing at most to do a limited share of reprogramming, and seek to answer a series of questions which lead eventually to a good environmental problem solution. The kinds of questions to be answered may be, "What if we experience release of toxic chemical A instead of B," or, "What effect on percolation to groundwater will result from release during the rainy rather than the dry season."

Thus our goal is to use computers so that they illustrate the structure of a problem and its solution: What parameters and parts of the science base are most important? Just how does the system respond to changes? If we have important policy goals - low cost, or maximum protection - which feasible alternatives are most likely to achieve these results? The computer permits us to go far beyond simply substituting numbers in a few standard equations, using the few hours available over a weekend. We expect to be able to look repeatedly at a problem, in a structured manner, and within a short period of time learn a great deal about its nature.

At present, however, we must acknowledge that we are treading on relatively untested ground. A period will be needed during which we try what appear to be effective approaches, sample responses, and learn to do better. This presentation, and the Software Fair displays planned to accompany it, will demonstrate our current status. Our problem-solving software in each instance had its primary origin in graduate-level teaching and research. Courses where these programs are to be used include upper division-undergraduate courses in "New Energy Technology: Resources, Conversion, Constraints" and "Waste and Hazardous Waste Management," as well as graduate course in "Geohydrochemical Engineering." The undergraduate courses, while in engineering, are open to and taken by a mix of students from across the UCLA campus.

Three software programs briefly described below are presented as an illustration of present activity. All have been placed in the public domain and with appropriate acknowledgement can be made available, together with documentation, to others who may benefit from their use.

Track

"Track" is a state-of-the-art model which tracks the movement of chemicals (toxics) from near-surface sources toward groundwater. It was developed by Rex Thanakij and Richard Perrine at UCLA, with support from the UC Water Resources

Center and the William and Flora Hewlett Foundation (Thanakij, 1986). Programming is in Digital Research Fortran-77 and the program runs on all systems using IBM - compatible DOS. Movement is followed in a typical case in one space dimension through the near surface geosphere (unsaturated zone) to eventually reach a groundwater aquifer (saturated zone). For multidimensional problems it can be adapted for use along curvilinear flow paths following definition of "stream tubes" which carry a defined share of total flow. The full range of interactions for any chemical within the several phases present is accounted for -- solution, vaporization, sorption and also degradation processes -- and through an extension, mixing by means of hydrodynamic dispersion. We use fugacity -- the thermodynamic "escaping tendency" -- as our concentration measure. We are not able within this model to treat capillarity and wetting processes completely. Thus we cannot describe in detail some final stages of fluid/chemical movement where gravitational and surface chemical forces nearly balance. (A model specifically designed to remedy this limitation is in the process of development.)

Mathematical development and computer solution are relatively sophisticated although the approach has its origins long ago in enhanced oil recovery (Fayers and Perrine, 1959). The several equations describing air and water flow, and the transfer of chemical at equilibrium between solution, vapor and sorption on solid surfaces is highly nonlinear. We use the method of characteristics to first transform these to a much simpler pair of ordinary differential equations describing unique paths within the system: "characteristic curves" or trajectories. Along these curves life is very simple and we solve much simpler equations to "track" what is happening. This approach has a price, however. One path may catch up with and intersect another, often with the mathematical result that two different values of a property (such as fluid saturation) appear to coexist at the same physical location. Mathematically, we must manage discontinuous change -- as is characteristic of shock waves -- in order to use this approach. This we do inside the software program, leading to a versatile, efficient and easy to use program.

The program as developed is menu-driven, offering the option of first running a test program by accepting default parameter values. By instead inserting parameters for a problem of actual interest to the user, any of a wide range of real situations can be addressed. Results computed and displayed include the fraction of soil pore space occupied by the wetting fluid phase (water), mass of chemical in each unit bulk volume as distributed within each phase, and concentration values in each fluid phase, all at selected times and managed spatial locations within the system. A particularly attractive feature is that the program is designed to facilitate study of problems in which varying rates of infiltration or source strength may occur over time. Cases may require from two to 20 minutes to run, with very complex cases requiring multiple runs. Example input data are included as Table 1 and a very limited selection of results as Table 2.

Geotox

Geotox is a package of programs which together provide a multimedia compartment model to follow time - varying chemical concentrations and link these to possible human exposure: intake through inhalation, food and water, and dermal absorption. The model was developed at UCLA to rank potential risks from toxics and radionuclides (McKone, Kastenberg and Okrent, 1983), and more recently has been modified to add organic chemicals (McKone, 1986). Programming is in Microsoft Fortran-77 and runs on all systems using IBM- compatible DOS. Because it originally was developed on a mainframe not all the user-friendly features one could ask for have been incorporated.

In a sense "Geotox" takes over where "Track" leaves off. Multimedia compartment models of this type can take original source input and describe the partitioning of chemicals among the various environmental media together with their transport and transformation, extending to at least a subregional scale. Geotox provides a useful starting point in an environmental assessment - a scoping effort - because it can cover all of the primary media simultaneously if not in detail. It is structured to describe complex systems incorporating hundreds of state variables. In reality, however, the information base on which we must build usually restricts us to a model with one or more atmospheric components, two or three soil zones, land biota, groundwater, and also sediment compartments.

Solarbed

As much as possible we should increase our use of renewable resources such as solar energy. But if we are to use the sun to heat a home in a severe winter climate substantial storage must be designed in order to handle it, for example, time-varying demand, extended periods of low insolation and unusual cold. Too much or poorly designed storage, or improper utilization will make the system uneconomic.

"Solarbed" is a software program which takes solar input as the heat in fluid from a collector and computes the changing temperature profile in a pebble bed storage unit/heat exchanger. Programming and mathematical development are by Mike Cai and Richard Perrine, developed with support from the William and Flora Hewlett Foundation. In Turbo Pascal, it runs on all IBM- compatible DOS. The variables of interest are two temperatures -- that is the (typically) air heat transfer medium and the rock storage medium -- as functions of space and time. Preliminary mathematical manipulation reduces the problem on the computer to solution of two quite simple equations, accomplished with great speed.

Solarbed is an example of our emerging software primarily developed for teaching use though also useful in applied research and engineering design. We selected Turbo Pascal as the programming medium, for example, because of its advantages in the teaching role -- Pascal is recognized as more a forerunner of future languages and computer use than Fortran (and much more so when the comparison is with Basic): the Turbo version is particularly well designed for interactive use and program adjustment, such as modification of a stock program to meet new design goals. Thus we have built user decision-making options in from the beginning. Many key problem-solving choices lie outside the computer, however. For example, the user must select a time of year on which to base design standards, establish insolation patterns (degrees north latitude, climate), circulation rates needed for effective operation (degree-day demand at critical periods), etc. The intent is to challenge the student by providing the opportunity to build on and optimize the basic program while putting it to design use. Example input data are given in Table 3 and results displayed in Table 4.

Conclusions

Our experience indicates that if the computer is to be used routinely in the classroom for more than trivial exercises, a great deal of preparation beyond past needs will be required. It will be particularly important to combine selection of programming software (such as Turbo Pascal) with selection of the basic problem - solving mathematical tools, and add flexible entry of decision parameters to provide opportunity and challenge to the student user. To appreciate the range of opportunity and complexity involved will require the interested reader to obtain and test these programs in person.

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A PROFESSIONAL IDENTITY FOR ENVIRONMENTAL SPECIALISTS

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The question to be discussed deals with uneven professional standards in industry, agencies and even consulting firms and environmental groups doing work in environmental management, and whether or not an effort among colleges and universities to develop a curriculum and professional culture for environmental specialists could improve performance standards among the institutions of environmental management. The question is discussed in J.M. Petulla, "Professional Standards in Environmental Management; The Environmental Professional Vol.7, No. 3 (1985), and is included in Petulla's Environmental Protection in the United States: Industry, Agencies, Environmentalists, to be published in Spring, 1987.

The background of the discussion is research that included interviews with nearly 300 environmental specialists in industry and agencies, along with several dozen activists in environmental groups, from seven metropolitan areas of the United States. Personal discussions with over 100 of the respondents uncovered many details of environmental management: e.g., besides background material on education and occupational experience information about day-to-day responsibilities, what kind of environmental policy the firm or agency followed, problems with regulations and regulators, pollution control strategies, problems and obstacles, outlook on environmental progress, etc.

One significant conclusion of the study is that there are tens of thousands of environmental specialists in the country working on similar problems with virtually no feeling of professional connection unless they happen to share an environmental commitment or belong to an environmental group. Their professional identity comes from their training (e.g. as an engineer or chemist), or their position (e.g. in an agency). The fragmentation of their professional status results from the institutional arrangements of environmental management, i.e. the system of adversarial and political conflicts through which laws are passed and implemented, and because of which people are trained to do the work of environmental management.

The question deals with the importance of environmental curriculum that will train people to work in industry and government as well as in education and natural history; with the need to establish an "environmental culture" that goes beyond both natural history and engineering. The results are in a corps of well-trained, committed specialists who have a great deal in common with others who work in the field, whether in industry, agencies, consulting firms or as staff experts in environmental groups; and enable them to act as technical negotiators, as described in the works cited above. This group of specialists conceivably could act as a "leaven in the mass" of society and represent a great leap forward in environmental quality throughout the country and world.

QUICK FIX ON A NEW PLACE

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Tourists visit cities, but they are not interested in learning about how the place works. Indeed, most people living in cities are not concerned about what factors shape their environments until some issue takes on personal significance. They often do not know much about those aspects of urban life that go beyond their day to day experience. Urban planners, on the other hand, must learn about the city if they are to offer reasoned policy for it.

Planners become students every time they study a new city. Each place is unique, and it requires a conscious effort to understand it. This has always been the case, but the issue takes on new importance in educating today's planners, because so many of them come from the suburbs and have little experience in the city.

In any case, planners must learn to grasp the important clues which identify activity patterns and development trends. They are interested in the city, not as an artifact, but as a setting for human interaction. In Grady Clay's terms, they need a "quick navigational fix" to help them understand what is happening. The "quick fix" idea is designed to help you rapidly spot the clues you need to learn about a new place. Works by Clay and by Alan Jacobs show how direct experience teaches about the city, but students need additional help to recognize clues and understand them.

The point of this essay is that you require a strategy to quickly learn about a new place...a way of making certain you are not misled and you do not skip something important. This applies to both American and foreign settings. You can abbreviate the approach for examining all of a city or just parts.

Here, then, is the strategy:

1. Prepare in advance, so you know something about the area.
2. Keep a journal to record your observations and questions.
3. Become familiar with the materials aimed at tourists.
4. Look at the local news media.
5. Go exploring with a good map of the city.
6. Take a city tour for visitors.
7. Read economic and planning reports.
8. Test your observations by asking questions.
9. Talk to local officials.
10. Write an analysis of your findings to test how all the pieces fit together.
11. Draw conclusions and make comparisons based on your previous experiences.

Let us explore each of these in detail:

1. Prepare in advance. Start by reading about the place. It may seem that reading materials will be mostly available in the place you are visiting, but it is easier to find them in your local bookstore or library before you leave. That allows you to study them in advance, and it directs you toward sources you will want later. You will not waste time after arrival searching for materials and beginning to read them.

2. Keep a journal. You should always write and draw about your observations and questions. Do it as you go along,

so your thoughts will be fresh. Later, you will find that your impressions change, but it is useful for you to look back at what you thought when you were seeing things for the first time.

Write names of places, people and things which arouse your interest. Keep track of the agencies which are involved in planning and development, so you can figure out the importance and the role of each. Even if, at first, you do not understand what they do, you can develop an agenda of things to ask later.

Whether or not you consider yourself an artist, you should sketch interesting buildings or street scenes. Drawing an object demands that you look at it closely. Diagram relationships among various areas you visit. The Kevin Lynch perception system offers one easy way to organize your thoughts, and you can develop your own shorthand to add to it. Your art work does not have to be sophisticated. You can keep it to yourself, if you want. However, you will discover your insights become clearer if you share them with others. They will be able to respond to your analysis and add new information.

3. Become familiar with the materials aimed at tourists. Collect things like travel brochures, tourist magazines and post cards. Visit a Tourist Information Center. It can be very helpful, although the people there seldom can answer detailed questions of the sort planners ask. Many times you can find help at hotels and transportation terminals.

   Tourist materials tell you about what Richard Meier calls the "city's image of itself." He says, "cities are braggarts: they polish up myths about themselves for delivery to their own citizens, as well as for naive visitors." You should analyze them to find out the myths, even if the myths are not true. If they are propaganda, regard them as such, and learn from them.

4. Check the local news media to find out what issues are in the public forum. Read local newspapers and listen to local radio and television. What topics are discussed? What names are in the news? Sensitive issues are often ignored in the tourist brochures, but you can find out about them in the local news.

5. Explore with a good map of the city. Memorize the names of important streets or landmarks. When you ask for directions, people name streets for you to follow. You need to know street names (and which way they run). The landmarks provide a set of references for orientation. You can select a hill or a tall building as a reference point to keep you from getting lost.

   Be careful not to skip over an out-of-the-way area which may turn out to be important. Remember that it is easy to find the monumental spaces and the "important" districts, but these do not fully disclose the nature of an urban complex. It is necessary to find out about the working places in the city. They are usually not on the tourist scenic routes.

6. Take a city tour for visitors. You will get to see what Meier calls "the city's best suit of clothes." Look for the landmarks which stood out in the tourist brochures. Remember the noteworthy things which catch your eye but go unmentioned in the tour. Think about what areas are avoided. You need to find out about them and why they are not featured.

7. Read economic and planning reports. You may find them in the business section of a newspaper. How big is the place in area and population? What indicators stand out? What are the rates of change? We expect that such reports are free of bias, but this is often not the case. For instance, reports issued by development promotion groups are presented in terms which make them appear to be objective and unbiased. In fact, they may select only facts that make the area appear attractive, ignoring trends which are not favorable to their case.

8. Ask questions. By this time you have enough background to test your observations by asking local residents about them. You should, of course, ask questions from the very beginning. Here we are talking about validating your first impressions. Local residents' perceptions may be very different than yours. It does not mean that yours are inaccurate or that yours are better than theirs. They may come from very different view points, and both may be valid as far as they go...or both may be based on myths. Planners are often criticized for not paying enough attention to the people who actually live in the city. Be sensitive: respect and try to understand the views of others.

9. Arrange to talk with public officials. You can obtain much more information in a single visit if you do some work in advance. You will know what questions to ask, and it will be easier to understand their comments when you organize in advance. Use interviews to clarify things which seem confusing, and seek out additional information about interesting topics. Your preliminary work will make it easier for the official to answer your questions. The easier it is, the better your cooperation and information will be.

10. Write an analysis of your findings to test how all the pieces fit together. You should go back over your journal to find out how your first impressions have changed and what conclusions you can make. What are the major trends? What changes are good and which are not? What things are already determined and what can be changed? What are the possibilities for the future?

11. Draw conclusions and make comparisons with your previous experiences. How is this place different from other places? How is it different now from how it was in the past? Most importantly: How is it likely to be different in the future?

Using the strategy can make it easier to learn how a city functions. You will not be mislead by false images, and you can begin to perceive the forces which shape the urban environment. It can provide the basis for further research efforts as you increase your understanding of the city and its people.

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DEEP ECOLOGY AND RADICAL EDUCATION

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This paper presents an outline of a radical education based on deep ecology. The concern of deep ecology is the survival of human communities in place on earth, which is, in fact, the goal of politics. Because survival is in nature, politics must rest on an ecological foundation. As a science, ecology describes the interrelationships of organisms and environments, that is the experience of living together in the biosphere.

Ecology is not a reductive discipline and is not readily amenable to quantification. Even scientific ecology is an integrative discipline that extends beyond the boundaries of science. Ecology is an amphibious discipline, with the authority of science and the force of moral knowledge. Studied through its components and relationships, ecology is a way of seeing, a perspective of the human situation in its interconnection. It is a subversive subject, normative and sensible, offering a "sacramental" vision of nature.

As a philosophy, deep ecology investigates the normative aspects of living together, that is, ethics, and the maintenance of the affairs of communities, that is, economics and politics. As a noetic discipline, deep ecology provides information of the state of nature, recognizing that human beings are participants in nature, part of the food chain for example, as well as participants in human societies.

Deep ecology emphasizes biological equality. When Charles Elton transformed the "Great Chain of Being" into a chain of eating, ecologists realized that the bottom link of the food chain, plants, was the most important. Humanity is part of the food chain, appropriating a large amount of the productivity of most ecosystems. The exploitative competition of humans in ecosystems is an important part of biogeochemical cycles. Humanity cannot unparticipate by choice.

Deep ecology argues for diversity. In nature, variety emerges spontaneously, as the capacities of species are sorted by the environment. Variety provides flexibility in systems. The diminuation of variety through human interference may debase the wholeness and stability of systems. Aesthetic, ethical, and utilitarian reasons all support the efforts to conserve the diversity of nature.

Deep ecology incorporates a broader scientific method that might be called patient practice. There are ways of dealing with the earth that are not scientific or technical; they are aesthetic or ethical. These alternatives are not incompatible with traditional science. The methodology of traditional science is limited and wasteful, promoting technologies that ignore or destroy values with blind quantification. Deep ecology considers the method of Goethe, whose natural philosophy incorporates a world view of organic dialectics and whose methods are contemplative nonintervention, a passive attentiveness, and the primacy of the qualitative, where intuition and the method of analogy work towards deeper sensory participation. This alternative considers the validity of every-day observations, unique occurrences, and short-lived phenomena. Goethe recognized that different people are sensitive to different aspects of a thing. Any investigative effort should incorporate the observations of many others.

Classical objectivity can be contrasted with a taoist perception. To examine nature in general a taoistic approach is useful: asking rather than telling, observing rather than manipulating being receptive and passive rather than active and forceful. Such an approach is nonintruding and noncontrolling. In dealing with living organisms, a caring perception provides kinds of knowledge not available to scientific researchers. This situation is especially true in ethological literature: Maslow, Lorenz, Tinbergen, Schaller, Van Lowick-Goodall, and Fox have found it to be true in their research.

Deep ecology is a form of scientific animism. Nature is a feeling system. Animism is necessary for understanding the system. Animism allows investigators to behave "as if" nature were intelligent and sensitive. Deep ecology is not a single-vision science or a primitive animism; it is a scientific animism, aware of the effects of its activity. It is concerned with more than the anatomy and taxonomy of organisms; it is concerned with the mutual experience between himan and nonhuman beings. It considers the human impact on nonhuman systems and human attitudes towards ecosystems. It considers human needs for sacred spaces and wilderness; it considers territoriality, aggression, and the aesthetic reaction to the wonder and beauty of life.

Deep ecology depends on a radical education to lead individuals out of ignorance in an informational wasteland. A radical education, based on the aesthetic humanism of F.

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Schiller, places humanity within nature. it offers a new perspective of humanity in the total field on nature and defines balanced relationships with other species.

Schiller believed that human society could be improved by political means. But after studies on the Thirty Years War in Europe, he became skeptical of the ability of politics to create a peaceful society. He came to consider a work on art (Reflections on the Painting and Sculpture of the Greeks, J. Winckelmann, 1787) historical proof that art could achieve what violence and law could not: art educates and liberates the individuals of society in a gradual and peaceful process. In spite of the cultural forces dominant at any moment, an individual has the potential to determine a different course of action. Unlike classical humanism, which was shackled to one interpretation of the past, the aesthetic humanism of Schiller was open to the possibility of novelty.

An ecological education based on Schiller's ideas presents a whole image of humanity within nature and not a transcendant view. It confronts the past without the baggage of sentiment and the future without the paralysis of dread. the appreciation of the differences of other cultures allows human beings to enlarge their experience and identities. Art broadens the mental worlds of observers and encourages tolerance and wonder. Education in aesthetic humanism embraces three concepts: liberation, play, and community.

Liberation Humanity has taken its own opportunities, which have been codified for centuries as rights. Now, plants and animals must be allowed opportunities. The interrelatedness of species dictates the interrelatedness of rights, and these rights are necessary to the integrity of the whole planet. The extension of rights to plants and animals does not deny any traditional human rights.

Play Play is the method of learning for most juvenile animals and a means of relaxation for many adult animals. For humans, play is an imaginative experience, entered into freely. Most human activity is play, in place in a community. Even science and philosophy are forms of play, attempts to solve the puzzles of existence.

Community Human beings gravitate into groups to live. Every culture needs its own local, sacred center, that cannot be broken if the group is to survive. Communication across the barriers of culture is necessary for a world community, but from firm cultural bases. The complete surrender of cultural identity is as dangerous as too little openness.

Education alters and enlarges perception with the selection and presentation of relevant information and forms an ecological consciousness. The survival of human societies depends on the consciousness of the global system in its complexity and connectedness. The spirit of humanity depends on the consciousness of the proper relationship of humanity to other species. Deep ecology is the basis for a radical education adequate to achieve ecological consciousness.

EDUCATING ENVIRONMENTALLY: ENVIRONMENTAL EDUCATION IN THE FACULTY OF ENVIRONMENTAL STUDIES

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This paper describes the Faculty's approach to education through a discussion of environmental education. Definitions of environmental education, the development of environmental attitudes and values in a society which contradicts those attitudes and values, and strategies and ojectives for environmental education are some of the issues addressed. The paper concludes that an environmental approach to education is a powerful way to help students develop an environmental perspective, and that an environmental perspective underpins our ability to function well in an information age.

SURVIVAL OF MAN: REFLECTIONS ON A COLLEGE COURSE

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This study analyzed the responses of college students to an environmental values inventory at the beginning and at the conclusion of a course in environmental studies (Survival of Man). One purpose of the inventory was to attempt to identify discrete personality ecotypes such as NeoMalthusian or Cornucopian. Another purpose was to identify changes in environmental perspectives that may occur as a result of a semester course in Survival of Man. Since the students represent a cross-section of the university, the differences among the scores of students majoring in the sciences, creative arts, social services, business, and technical careers were also investigated. In addition to these specific interest groups, the relationships between age and student scores and between gender and student scores were also studied.

Environmental Studies

ACID PRECIPITATION IN THE PACIFIC NORTHWEST

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Sensitivity of Ecosystems in the Pacific Northwest

Over the past decade acid rain has received much media exposure. However, the term has seldom been used to describe atmospheric conditions in the Pacific Northwest. Although the Northwest has not, to date, experienced significant environmental damage from acid precipitation as has eastern North America, some scientists believe that the Northwest should be concerned about the vulnerability of some of its sensitive ecosystems to acidification. In fact, in Scandinavia and eastern North America, damage to ecological systems and human artifacts has occurred in regions with the acidity of precipitation near the lower end of the range of that found in some western ecosystems (Roth et al, 1985).

The geological features of high elevation and low buffering capacity (crystalline rock) of the ecosystems of the Pacific Northwest make them particularly sensitive to acid precipitation. In the upper elevations of the Northwest, snow acculumlates high concentrations of sulfur and nitrogen oxides which create a surge of acid during the spring snow melt in aquatic ecosystems. The short growing season at high altitudes impedes the ecosystems's recovery from this stress. The thinner soils, steep slopes, and granitic bedrock in the Cascade mountains have a very low neutralizing capacity to acid influents. For example, of the 29 lakes sampled in the Washington Cascades, alkalinity ranged from 4 to 190 ueq/L with a median of 57 ueq/L. The U.S. Environmental Protection Agency classifies an acid sensitive lake as one with alkalinity below 200 ueq/L (Roth et al, 1985).

Ecosystems are in jeopardy where sensitive resource areas and acidic deposition overlap. At risk are the important forest, agriculture and aquatic resources of the Pacific Northwest which are the foundations of the Northwest's economy. Thus, we should be very cautious in protecting these ecosystems from acid damage.

Sources of Acid Deposition

The main precursors of acidic precipitation are sulfur and nitrous oxides which are discharged by power plants, industrial processes and motor vehicles. When these compounds react with water and sunlight in the atmosphere, they form acids such as sulfuric and nitric acids.

The major non-point sources of these emissions in the northwest are from transportation and urbanization. For example, central and southern Puget Sound emissions from urban areas are estimated at 195,000 tons of SO_2 per year and 130,000 tons of NOx per year. Two major point sources of nitrous and sulfur oxides are the Centralia Power Plant in Centralia, Washington (which has been discharging 59,000 tons of SO_2 per year and 37,000 tons of NOx per year) and Mt.

St. Helens (which discharges 112,000 tons of SO_2 yearly) (Duncan, 1984).

Transport

Storms in the Puget Sound begin with low level winds pushing the polluted air mass from the urban and industrial areas to the north. Significant deposition occurs on the coastal plain of the basin and lower slopes of the surrounding mountains. Deposition could be fairly widespread over the basin. However, because of the high frequency of precipitation events in the Pacific Northwest, most of the pollutants are washed out of the atmosphere immediately downwind from the source regions. A surge of acid is often measured at the onset of a precipitation event. This is thought to be due to the build-up of acid precursors during the preceding dry period. This initial surge is often followed by lighter rainfall lasting a long period of time but at much lower levels of acid concentrations. This lingering low level deposition may occur at a considerable distance from the source areas with a gradient of progressively lower levels of acid in the Puget Sound and Vancouver lowlands and the lower slopes of the Cascade mountains. The distribution of local versus distant sources of acid deposition also depends in part upon the local rate of conversion of oxides to acids in addition to atmospheric currents and topography. In the summer months when precipitation is less frequent, transport of acid precursors away from major source areas is more likely to occur (Pennell, Hales and Scott, 1984).

Deposition

Wet sulfur deposition throughout most of the Pacific Northwest is much lower than the 20 kg/ha/year target level established as the threshold for ecological damage in eastern North America and there is currently no conclusive evidence of significant environmental damage in the region. However, it is apparent that some areas of the Northwest are currently receiving significant sulfur loading.

Areas of particular concern include southwestern British Columbia and the Puget Sound Region. In southwestern British Columbia and in the mountain slopes north of Vancouver, sulfate deposition has been measured above the 20 kg/ha/year target. This wet sulfate deposition may be causing damage in the lakes and rivers of this region, yet no conclusive evidence of damage exists to date (Nikleva, 1984). Precipitation in the Puget Sound region has a pH range from 4.0 to 4.5 while to the east, the Cascades receive large quantities of precipitation ranging form pH 4.6 to 5.0. The acidity of natural unpolluted rainfall is generally considered to be in the range of pH 5.6 (Kikleva, 1984).

Ecological Impacts

Several scientific studies have provided strong evidence which suggests that aquatic ecosystems, terrestrial ecosystems and human health are adversely affected by acid deposition. For example, salmon stocks in British Columbia's coastal mountain range could be in jeopardy if acidic deposition continues in this region. Laboratory data indicate that a pH of 5.0 or less of surface waters could cause increases in the mortality rates in the early developmental stages of Pacific Salmon (Geen and Frankenhuyzen, 1984).

In general, damage to aquatic ecosystems from increased acidity is characterized by decreases in species diversity and productivity. Field studies also indicate that low pH waters are toxic to phytoplankton, zooplankton, and especially fish and amphibians (Roth et al, 1985).

Acid precipitation is also known to decrease the levels of essential calcium and magnesium nutrient cations from the soil, and change the cycling and availability of other nutrients. Acid precipitation has also been implicated in the mobilization of toxic metals and the alteration of microbial activities. This can reduce overall system decomposition and produce a health and ecological hazard to living forms from toxic metals.

No conclusive evidence currently exists suggesting there are significant environmental impacts from acid precipitation in the Northwest. However, due to the extreme sensitivity of Cascade streams, lakes, and soils to acidification, a conservative management approach and further research are definitely warranted.

Current Regulation and Management

Although both the United States and Canada have Clean Air Acts, the management effort of both countries has been criticized as insufficient and ineffective.

The Canadian Clean Air Act which came into effect in the early 1970's was developed to regulate pollutants which were hazardous to human health and emanating from federal institutions. However, most of the institutional mechanisms for waste management and pollution control in Canada are at the provincial level of government.

For Example, the Waste Management Act of British Columbia provides for the issuance of emission permits which allow specific levels of effluents for individual industries. However, enforcement problems do exist. This results in inconsistent applications of pollution control across industries with polluters rarely being fined or brought through the judicial process. For example, in a 1981 report by the Auditor General, 14 of 39 permits sampled were in violation of permit conditions with no enforcement proceedings to rectify the situations (Rankin, 1984).

Under the Clean Air Act, the Canadian Goverment has established National Emissions Guidelines for different industries. The effectiveness of these guidelines depend upon the timelines and degree of enforcement of these standards by provincial governments. There currently exist no mandates which require provincial governments to adopt Federal Clean Air Act provisions. (Subcommittee on Acid Rain, 1983).

The Clean Air Act in the United States is based on the establishment of individual control strategies called State

Implementation Plans (SIP's). These plans outline emission control guidelines and air quality standards for specific sources and regions within the state. Although amendments to the Act required some areas to reduce SO_2 emmisions from stationary sources, the EPA has generally claimed that it lacks authority under the Act to address the acid rain problem directly. The result is that many states and regions remain today in non-compliance with federal air pollution control standards.

Proposed Non-Degradation Policies

In light of these inadequacies of the current management approaches of Canada and the United States to control the degradation of acid sensitive areas, it is apparent new policies and approaches need to be adopted. (Roth et al, 1985) offer the following suggestions to guide both countries toward a bilateral solution to averting future problems.

-Substantially increase the number of precipitation monitoring sites especially near sensitive ecosystems to more accurately understand the cause and effect relationships of acid precursors.
-Establish a regulatory plan to reduce NOx emissions from mobile sources by requiring vehicular maintenance inspection programs and providing incentives to use mass transit in urban areas.
-Congress should not extend the Non-ferrous Smelter Order (NSO), exempting smelters from emission reductions requirements of the Clean Air Act beyond the current expiration date of December 31, 1987.
-The EPA should assess the contribution of major power plants to acidic deposition in sensitive areas.
-State and Federal air pollution regulatory authorities should amend their regulations for permitting new facilities making the cumulative impact of emissions from a proposed facility in a sensitive region a siting consideration.
-Promote energy conservation as a non-polluting resource.
-Establish an International Joint Committee to establish an acid precipitation non-degradation policy for the Northwest similar to the policy established between the U.S. and Canada to protect water quality of the upper Great Lakes.

It must be recognized that no simple solutions exist to a problem as diverse and complex as the potential of acidification of sensitive ecosystems. However, a sustained effort to better understand a problem with consequences as harmful as has been witnessed in other parts of the world deserves serious attention.

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CONSERVATION OF SEABIRDS ON THE NORTH SHORE OF QUEBEC AND OF GEESE ON THE YUKON-KUSKOKWIN DELTA OF ALASKA: STRATEGIES FOR SUCCESS

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Two conservation issues -- seabirds on the North Shore of Quebec and geese of the Yukon-Kuskokwim Delta in Alaska -- are comparable in the challenges they pose to wildlife managers and in their practical solutions that emphasize the important role of education in wildlife management. Problems in both instances are directly or indirectly linked to the Migratory Bird Treaty between Canada and the United States. The setting for one is some of the oldest wildlife sanctuaries in North America, the other, one of the newest and largest refuges in the U.S.

The Lower North Shore of Quebec (part of the North Shore of the Gulf of St. Lawrence) consists of 15 villages averaging 350 persons each; 80% of the population is White anglophone. The primary economy is cod fishing; crab and seal fishing, trapping, and wood gathering are important seasonal activities. The Yukon-Kuskokwim Delta region consists of some 50 widely scattered villages of approximately 50-650 persons each. These villages comprise most of the Yup'ik Eskimos of Alaska, who live a semi-subsistence lifestyle that depends heavily on the harvest of fish, mammals, birds, and plants.

The problem in both coastal regions of North America is that of dwindling bird resources due in part to illegal exploitation of birds and eggs and disturbance on the nesting grounds. In the Gulf of St. Lawrence, populations of Common Eider, Razorbill, Common Murre, and Atlantic Puffin have experienced several fluctuations during the past two centuries (Chapdelaine, 1980). On the Yukon-Kuskokwim Delta, populations of Cackling Canada Geese, White-fronted Geese, Pacific Black Brant, and European Geese have dramatically decreased over a period of twenty years (Pamplin in press). Most recently, several of the Quebec populations have stabilized, but in Alaska the Cackling Canada Goose has dropped to what some biologists would label as endangered status. In both regions, local disagreement with wildlife laws and inconsistent enforcement has led to public distrust of wildlife agency management. Lack of information and education has engendered misconceptions about wildlife ecology. Factors of geography, culture, and a changing economy contribute to the problem of illegal hunting, egging, and disturbance.

Seventy years ago, the Migratory Bird Treaty was signed between the U.S. and England on behalf of Canada with one salient purpose: that no more bird species be allowed to become extinct. The Treaty was an important achievement in wildlife conservation; nonetheless, it and the accompanying Convention Acts contained several anomalies and provided no guidance on how to enforce wildlife law in remote, rural areas where people depended on wild birds for food. Particular elements at issue are as follows: (1) closure of spring hunting, (2) classification of gulls, alcids and certain other birds as "nongame", (3) special exemption to residents of Newfoundland and Labrador for a subsistence hunt of murres, (4) exemption to Native peoples hunting alcids in non-sanctuary areas.

The exemption to outport residents of Newfoundland and Labrador was granted in 1949 at the time that region became a province of Canada. Recently extended to include all residents of the province, the exemption is now questioned by biologists who believe the hunt serves mainly as sport and that the total annual take may be dangerously high. It is a confusing situation to residents of the neighboring North Shore of Quebec; where, for example, only one-half of all heads of households understand their own regulations on murre (Blanchard, 1985). Shooting seabirds out of season and gathering eggs are common problems.

Meanwhile on the remote Yukon-Kuskokwim Delta of Alaska, the U.S. Fish and Wildlife Service and Alaska Department of Fish and Game have allowed Yup'ik Eskimos a spring subsistence hunt of Cackling Canada and other geese for food needs. The policy of tolerance toward spring hunting and egg gathering by Natives was based on inherent difficulties of enforcing wildlife laws and Native insistence on the importance of the harvest to their economy, diet, and culture.

Responses to these problems have differed. The Alaska issue received flyway-wide attention; whereas, the plight of Quebec's seabirds was relatively ignored in the U.S. Sportsmen's groups inside Alaska filed suit against USFWS and ADF&G for not upholding the Treaty. On the Quebec North Shore, a grassroots effort was launched to educate the local citizenry and to foster a local attitude of shared responsibility. In both instances, wildlife managers realized that the best solution to their wildlife problems was by combining strong educational programs with an overall balance of research, habitat protection, and enforcement.

The grassroots effort on the Quebec North Shore is directed by a non-profit organization called the Quebec-Labrador Foundation (QLF) and its Atlantic Center for the Environment. For the past ten years, QLF has sponsored a Marine Bird Conservation Project under the premise that a lasting decrease in illegal hunting can be achieved when local people take a positive, active role in conservation. The objectives of the project are as follows: (1) teach people about seabird biology and conservation; (2) promote conservation attitudes and lawful, sportsmanlike behavior; and (3) establish a locally-run support base for conservation. The project conducted research into the knowledge, attitudes and activities of local people and developed a series of strategies to engage people in conservation. Those strategies, discussed in papers by Blanchard (1986) and Blanchard and Hallowell (1986) involved summer youth programs, leadership training, the development of educational materials, and a broadening of support by agencies and organizations. Evidence for success can be seen in several areas: fewer law violations involving hunting, egging, and habitat disturbance; increased knowledge and concern about seabirds among youths, teenagers, and adults; greater involvement of government agencies and non-governmental groups in habitat protection and enforcement; and interest and motivation among local people for leadership roles in conservation.

Several strategies for the conservation of geese nesting on the Yukon-Kuskokwim Delta have been organized by an information and education Task Force headed by Sue Matthews of the US Fish and Wildlife Service in Anchorage, Alaska (Laycock, 1985). Leaders of Yup'ik groups have been an integral part of the Task Force, particularly in village visits to explain the problem and to solicit voluntary restrictions to the harvest. The Task Force has placed emphasis on the development of educational materials and on teacher workshops in the villages. It has received considerable help from the National Audubon Society, which has provided positive and widespread publicity for the project. Evidence of success can be seen in a documented reduced harvest of geese and eggs. Good will abounds in the villages.

Approaches to wildlife problems in both regions of North America fit guidelines stemming from the Conference on Science and Technology Education held in 1985 in Bangalore, India, which called for the need to make environmental education issue-related and community-related. Both projects are targeted at behavioral change through increased knowledge and the influence of peer pressure. They both place an emphasis on school-aged children, on the assumption that conservation attitudes can be more easily fostered during the impressionable years. They employ teenagers in conservation jobs that entail training by professionals. They have a research component that monitors the harvest level. They place particular emphasis on the development of local conservation committees. The active participation of local people is tantamount of both projects.

Organizers in each case are committed to the achievement of long-term goals through patient monitoring of progress, nurturing of local input, and frequent interaction with researchers and wildlife agencies so as to ensure constant up-to-date understanding of the problem. Dialogue between projects has transpired since April of 1985. More sharing will be encouraged in 1987 as Canada marks its one-hundredth anniversary of the establishment of wildlife sanctuaries.

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THE U.S. SUNBELT: GROWING PAINS IN PARADISE

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The redistribution of population is an important facet of human population dynamics. Mobility is not a new phenomenon in the United States. Americans have always been a mobile population, the peak of mobility occurring between ages 20 and 35 after completing schooling, marriage, and/or entering into the labor force. Family and economic changes continue to affect migration after age 35. As an example, the western region of the United States has recently grown fastest. The U.S. center of population has continued to move westward. In 1790, it was 23 miles east of Baltimore. It reached Missouri in 1980 with a recent April 28, 1986 census estimate placing it 10 miles northwest of Potosi in central Missouri (U.S. News and World Report).

The United States has also experienced other relocations.

For example, blacks migrated back to the south in the 1970's reversing the flow to the north after the Civil War. Florida has also been the recipient site for Cuban and Haitian relocation.

Between 1970 and 1980, the south and west, the U.S. sunbelt, accounted for 92% of national population growth. California, Texas, and Florida accounted for 42% of national growth in the 1970's, as California became the most populous state. At the peak of the oil prices, Houston, Texas gained 10,000 individuals per week, albeit, currently, with the oil glut, the reverse growth is in progress. Reasons for sunbelt population shifts include the relocation of industry seeking cheaper labor and energy costs, the settlement of young college-educated individuals, and the resettlement of retirement-aged persons towards geographically attractive sunbelt locations.

While the redistribution of a portion of existing U.S. population to the sunbelt has created obvious environmental impacts, the movement of illegal immigrants into the U.S. sunbelt can also be expected to exacerbate environmental problems, placing undo stress upon both our cultural and natural resources (Biggar, 1979).

Six out of every ten illegal aliens come from Mexico, but Central and South America, the Caribbean, Asia, the Middle East and Europe, are other sources. "...For weeks, tens of thousands of refugees from Cuban communism landed by the boatload at Keywest, while the U.S. Government, at first unwilling, then unable to stop them from coming, looked on..." (Crewdon, 1983). Such major events as the Mariel boatlift, and the illegal immigration problem in general demonstrate the weakness of U.S. immigration policy, and the impotency of the understaffed, inadequately funded U.S. Immigration and Naturalization Service.

Not only does the extreme economic difference between Mexico and the U.S. create such pressures, but it is important to note that Mexico serves as a corridor for those moving from politically troubled nations, noticeably Honduras, Peru, Argentina, Ecuador, Columbia, Guatemala, and El Salvador. Most are fleeing the same problems as Mexico counterparts--poverty, soaring inflation, political strife, and the general press of population growth. "Mexico is among the most efficient nations in the world at providing people; it is among the least efficient in meeting their needs. At the moment half of Mexico's work force is either out of work, or what economists call under-employed. Every year three-quarters of a million Mexicans enter the job market--Where does one go to escape from a crippled economy, from a country where a third of the people suffer from malnutrition..." (Crewdon, 1983). Each year males head logically north from Mexico (bounded by two oceans on the east and west and by a violent border to the south) to a geographic area with familiar-sounding names. Many return at Christmas or the following summer. Some estimates indicate 5,000/day crossing U.S. borders, and that numbers apprehended represent merely 1 in 5, for a total of one million per year. Most enter the 2,000 mile Mexican-U.S. border--the longest world border between a more developed and lesser developed

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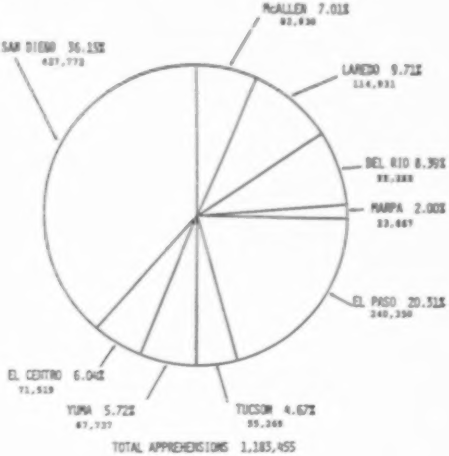
nation. San Diego County is currently the site of the heaviest trafficking in illegal immigrants (Figure 1). Deportations over the last twenty years have increased from 6,558 to 427,772 (United States Border Patrol...). It is impossible to tell from such data, however, how many apprehensions and deportations are repeat offenders.

Figure 1 U. S. Border Patrol Apprehensions for the Southern Border, 1985



This exodus has tremendous cultural, and environmental implications, since the United States may be gaining 1-5 million illegal aliens per year. Illegal immigration figures are not included in the total U.S. net annual population growth figures of 1.6 million (U.S. Population...). The vast majority of illegal immigrants are ill-educated, poor and without skills, but place demands upon cultural and environmental resources. Smuggling of illegal aliens has become so lucrative that many criminal rings are shifting from drug trafficking. (U.S. News and World Report, April 1986) Careless record keeping, or the absence thereof, due to inadequate budgets and personnel of the U.S. Immigration and Naturalization Service make accurate figures impossible to obtain. Even if the conservative estimate of approximately one million is correct, then illegal immigration (primarily settling in the sunbelt) may be equal to total annual U.S. population growth from natural increase (births-deaths). The resulting impacts upon land, water, and wastewater, to mention a few environmental concerns, can obviously be expected to be dramatic.

Orange County, a center for sunbelt population redistribution and a recipient of illegal aliens from its southern neighbor, San Diego County, has experienced tremendous environmental impacts as a result of recent population increase. Population statistics for Orange County indicate heavy growth due to migration in the early part of the century with peaking in late fifties to middle sixties, and again in the early seventies. Natural increase, (births-deaths) as a contribution, increased in the middle 1940's to late sixties and early 1980's mimicking the national trends of post-World War II baby boom generation and now the echo boom. Migration as a percent of increase was steadily high from 1940-1964, tapering off in the middle 1960's (Orange County Progress Report).

One impact of gradual increase in population has been the stress placed upon drinking water. Orange County, located between Los Angeles and San Diego, occupies a semi-arid region of southern California, ;receiving less than 15 inches of rainfall each year. There are no major rivers or surface water supplies within 100 miles. With a population of two million, local water supplies provide less than one-third of water currently required. Water has been imported for 60 years to supplement the inadequate local supply. In 1920, a metro water district was organized to buy water from the Colorado River and in 1960, MWD contracted with the state to divert more water from Northern California. Recent Court decisions have forced reduction by more than 50% of California's entitlement to Colorado River Water. In a recent referendum, California voters did not approve funds to construct facilities to deliver water from the outside. Heavy demands on local groundwater supplies following the population growth boom forced water levels to drop. As a result, seawater has pushed 6 km inland. It was decided that by recharging the aquifier through a series of injection wells, a hydraulic barrier could be formed to push back seawater. Conservation, reclamation, or new sources were the only options. After evaluating, current shortages, projected future crises during severe drought, environmental and economic considerations, "Water Factory 21" was conceived (Argo, 1985). Since 1976, it has produced nine trillion gallons of potable water from treated, reclaimed activated study feedwater. Unchlorinated, treated activated sludge effluent from wastewater treatment is taken through a process of lime clarification, air stripping for volatile organics, recarbonation, prechlorination, GAC (granular activated carbon) and reverse osmosis (RO) demineralization. An intense three-year EPA study was completed in 1981 (Argo, 1986).

Part of the study included analyses for compounds on EPA's list of priority pollutants and a range of organics. Results indicate that the reclaimed water meets established drinking water standards. Granted, many consider existing standards inadequate, especially for trace organics. Advances in membrane technology have, however, also become very effective in removing trace organics. With RO treatment all secondary criteria were also met. No evidence was found that reclaimed municipal wastewater would pose a significant health risk. Reclamation was shown to be comparable or more energy efficient than importation of water. The treated water will then be injected into the groundwater basin. In actuality, this process occurs in many areas of the United States. For example, there are 315 discharges permitted to release a daily discharge of 1,222 million gallons of wastewater effluent daily into the region of the Ohio River upstream from Cincinnati intake. Thus, the river water contains 19% wastewater. Ultimately, this mixture will become Cincinnati's drinking

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water.

Through the technologically efficient design of "Water Factory 21," the immediate environmental pressures of population growth on water availability in Orange County have been temporarily resolved. Still, in the long run, this kind of growth places a community in a precarious situation in the face of unpredictable natural emergencies. More importantly, it is only one exemplary environmental stress of a myriad of others caused by pressures of the various components of human population growth which include natural increase, redistribution, and illegal immigration.

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EDUCATION AS A TOOL FOR WILDERNESS MANAGEMENT

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A major resource in the American system of public land is wilderness. The U.S. Congress established the National Wilderness Preservation System in 1964 and that system has grown to nearly 90 million acres with prospects of more land soon to be added. The system was established to preserve and protect specific values of wildness, including naturalness, solitude, unconfined types of recreation, and ecological, geological, scientific, educational, scenic and historical values. These values are found in a system that is very diverse ecologically. Wilderness units vary dramatically in size. Many are close to population centers and many are remote. The challenge of managing such a large and diverse system is very great. Education must be one of the tools in the process of management.

Management of wilderness seems a paradoxical idea--the process suggests control and manipulation of a resource for which the primary values involve lack of human influence. Wilderness management is largely people management rather than manipulation of the ecological impacts of many people using wilderness areas. Problems of ecological impact include soil erosion and compaction, destruction of vegetation, water pollution and litter, among others. There is need also to minimize social impact problems such as crowding, access difficulties and esthetic degradation that reduce wilderness traveler's experience of the values for which the system was established. Methods to achieve these management goals are being developed and studied, though the field of wilderness management is an infant endeavor.

The challenge of managing the wilderness resource is increased by the ecological and geographic diversity of the resource and by the diversity of wilderness users with their often conflicting goals. Another problem is a very limited allocation of funds by government to wilderness management. There is special need for extensive research, yet funds for this are not forthcoming. One clear finding of sociological research on wilderness is that users desire information and prefer indirect educational approaches to management to more direct approcahes which usually involve some sort of regulation.

What is the current status of educational approaches to wilderness management? All such efforts are used in tandem with regulatory approaches. The mix of approaches varies greatly from agency to agency and through the system. Efforts to educate for responsible wilderness use may be described as follows:

1. Professional wilderness managers working for federal agencies like the National Park Service, the U.S. Forest Service, the Fish and Wildlife Service and the Bureau of Land Management, use both direct and indirect educational approaches. These include:
   Direct educational approaches
      -ranger station contacts
      -trailhead contacts
      -interpretive talks
      -backcountry ranger contacts
      -user group contacts away from wilderness (presentations to outdoor clubs, youth organizations, schools)
   Indirect approaches
      -AV programs (slide-tape, videos, movies)
      -brochures
      -handout sheets
      -maps
      -posters/garbage bags
      -displays
      -news releases/newsletters

2. Various outdoor education program educate users. There are several types of such programs:

   Wilderness leadership schools-- the aim of these is to teach people how to become effective outdoor leaders, including how to responsibly use the resource. A leader in this category is the National Outdoor Leadership School.

   Adventure Education programs-- Outward Bound schools are the best known of this category. The principal aims of such programs involve the personal growth of participants, but virtually all include environmental awareness goals in their purpose. More emphasis on education for responsible use seems necessary in this category.

   Youth agency outdoor education programs-- Included here are Scouts, Campfire, YW-YMCA, religious youth groups, etc. Wilderness use education by such groups is haphazard. More widespread and systematic wilderness use education seems necessary in this category.

3. Outing clubs and related organizations introduce many people to the wilderness. included here are such groups as the AMC, Mountaineers, and Sierra Club--what may be called general membership organizations. Included also are college and university outing clubs and outdoor programs. Many of these groups preach responsible use and hold training. Research on the extent and effectiveness of their efforts should be done.

4. Formal instructional programs in colleges and universities deal in various ways with wilderness. Recent research by Hendee and Roggenbuck found that 154 schools offered wilderness-related courses. The principle objective of such offerings was "wilderness appreciation, use, enjoyment and skills". There might be some wilderness use education in all of this, but the picture is not clear. It seems most likely that academic courses deal with wilderness as an abstraction and are not aimed at teaching about problems and how they might be solved.

This summary of education for wilderness leads to several observations:

A. There is a great need for research to ascertain what various user groups are doing in wilderness-use education and to ascertain the effectiveness of their efforts. There is need to study what educational approaches work best with particular groups, in particular places and with specific problems.
B. There is need to awaken wilderness advocates to the fundamental idea that legislative designation of an area as wilderness is not protection. Legislation merely establishes the possibility of protection. Advocates and users both need to be educated about the need for and

nature of wilderness management.

C. Wilderness use education will require committment of time, energy and money. It will all require support for research.

In the end, education for wilderness protection and preservation is essential if the values of the resource and of the wilderness experience are to be retained. If the philosophical ideals that created the wilderness preservation system are to be nurtured, indirect management is essential, and education must be a powerful part of such management.

ANIMALS FROM DOWN UNDER

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Australia has many kinds of animals which cannot be found here in America. This presentation will summarize some of Australia's native animals in the reptile, bird and mammal categories.

REPTILES

- Snakes. Australia has many snakes. Five of the most prominent, due to their level of toxicity are the taipan, death adder, tiger, brown and black snakes. The tiger, brown and black snakes are regularly found in the Sydney region. They feed on lizards, other snakes, rats and mice.

- Frilled Neck Lizard. When disturbed, this lizard puffs his skin out like an Elizabethan frilled neck collar (Elizabeth I) to scare off the unwary animals, and sometimes people! It can also change colour rapidly and can be an awesome sight to the young, uninitiated child. These lizards feed mainly on insects, other lizards, flowers, fruits and succulent leaves.

- Goanna. Can grow to as large as three or four feet in length. This reptile feeds on insects, other lizards, mice and eggs.

- Blue Tongue Lizard. Is a slow moving lizard which is harmless and often kept as a child's pet. It uses bluff-tactics to discourage its enemies by huffing and puffing to make its body bigger, and by flicking its blue tongue in and out of its mouth in an attempt to ward off attack. This lizard feeds on insects, small lizards, flowers and fruit.

- Gecko. Has a large fat store in the tail which well drop off if threatened or roughly handled. They have large lidless eyes which they keep clean with constant licking. Geckos are well adapted to change their color for camouflage. They feed on insects.

BIRDS

- Cockatoos, Rosellas, Parrots, etc. Australia is well known for these species of birds because of their variety and brilliant colors. Some of them include the Major Mitchell Cockatoo, the Eastern Rosella, Crimson Rosella, King Parrots, Galahs, Rainbow Loriket, Corellas and Budgerigars. They feed on seeds and insects, grubs and grasses.

- Kingfisher. Most kingfishers (including the Kookaburra and the Sacred Kingfisher) rarely catch fish. They use their long powerful beaks to catch ground creatures. The Kookaburra has a very distinctive laugh. The Sacred Kingfisher feeds on large insects and small lizards, while the Kookaburra feeds on lizards and snakes as well as large insects.

- Kites and Eagles. The major differences between these two types of birds are their shape and size and the fact that kites have feathered thighs, whereas eagles have feathered legs as well. Wedge-tail eagles pair for life and claim a huge hunting territory. They build and renovate several huge stick nests. They feed on dead animals as well as capturing rabbits, birds and reptiles. Kites feed mainly on insects and lizards as well as on dead animals.

- Magpies. These are black and white birds that live in social groups comprised of a dominant male and female, accompanied by several younger magpies. The group has a defined territory, from which it will forcefully attack and evict all intruders - including humans. Magpies require large trees for nesting and open ground for feeding. They feed on small lizards, insects and other small ground animals.

- Owls. Owls found in Australia include the Barn Owl, the Boobook Owl and the Tawny Frogmouth Owls (although the Tawny Frogmouth is not officially an owl). They feed on rats and mice, night flying insects, spiders and centipedes.

- Emu. The Emu believes in paternal responsibility. The female lays eight to ten eggs while the male sits on the eggs for about two months until they hatch, after which he looks after the young chicks until they are about eighteen months old and are able to look after themselves. The adult emu stands about six feet high, with drooping wings of about four or five inches. Their feathers are more like several strands of hair or fur per feather. They feed mainly on grasses, fruits, flowers and insects.

MAMMALS

There are three major groupings of mammals: 1) Monotremes - (egg laying), 2) Marsupials - (pouched females), and 3) Placentals - (young born as miniature adults from the womb).

- Monotremes. There are only two mammals in the world that are monotremes. They are both found exclusively in Australia.
    - Platypus - The platypusisa is a shy creature which generally lays two small white eggs in a burrow under ground. The burrow has several entrances each of

which is generally softly closed with earth to keep the burrow and the young platypuses warm. The mother platypus is without a pouch or teats, but still feeds her youngsters milk from the pores on her belly. When underwater the platypus closes its eyes and ears and does not breathe, but holds enough air in its lungs for approximately ten minutes. The beak is not as hard as you might expect, (as people sometimes refer to this animal as a duck-billed platypus) but is soft and rubbery and is a very sensitive part of the platypus body. They feed on small river insects and animals and vegetable matter on the river beds.

  - Echidna - The echidna babies are also born from eggs, but the mother echidna has a pouch with teats inside. As the youngsters grow their quills and hair, they become adapted to walking and helping to forage for their own food. They have a long pink sticky tongue and they fed on ants, termites and other small insects.

- Marsupials. These animals can be classified as herbivorous, omniverous and carnivorous.

  - Herbivorous Marsupials. These include bandicoots, hopping mice, sugar gliders, greater gliders, pygmy possums, ringtail possums, koalas, kangaroos and wombats. Each of these animals have pouches. The tree dwelling marsupials have their babies on their backs after they grow too large for the pouch, then the babies learn to walk and climb independently. The ground dwelling marsupials do not have their babies on their backs after they grow too big for the pouch. Common features of some of these marsupials are the hand-like paws, sometimes on both front and back; and that they have a pair of grooming claws on their hind feet and are very clean animals, and well groomed.

  - Omniverous Marsupials - Omniverous marsupials include the brush-tail possums. These animals feed on leaves, blossoms, insects and small birds and their eggs. They also have hand like paws.

  - Carnivorous Marsupials - Carnivorous marsupials include the Tasmanian devil and the spotted quoll. These animals feed on mice, lizards and small birds.

- Placentals. This group of mammals bear their young from a womb.

- Dingo. This is a type of dog thought to have been introduced to Australia by Aborigines over 6,000 years ago. Dingos differ from domestic dogs in the fact that they do not bark, but rather howl. (The dingo can interbreed with dogs however). In times of drought, dingos often pack together to hunt, but they are usually loners. They feed mainly on rabbits, mice, kangaroos, lizards, birds and insects.

ACID DEPOSITION: RESEARCH, INFORMATION, POLICY A COLLOQUIUM FOR STATE AND PROVINCIAL OFFICIALS

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Air quality officials from many U.S. states and Canadian provinces met and shared their different perspectives on a common issue: acid deposition. The Acid Rain Foundation and The Johnson Foundation sponsored a September 1986 meeting of officials of states and provinces: to promote discussion, to share information and ideas, and to build a basis for cooperation.

Research, Information, and Policy were main topics of concern. Participants brainstormed, shared ideas from their different experiences, and discussed strategies for better acid deposition/air pollutant research, control, and information dissemination. Resource persons were also present and added to the discussions.

The brainstormers recognized the complexity of the acid rain problem. They pointed out the need for cooperative, holistic research on air pollutants. For example, both U.S. and Canadian governments should study the synergistic effects of pollutants like SO_x, NO_x, volatile organics, etc. Generally, states, provinces, and European countries should cooperate and share information more.

They also saw a need for more public information. For example, energy conservation is a way to improve the environment and more conservation methods should be available to the public. The job benefits of the pollution control industry should be known as well. Finally, the public should know more about the broad nature of air pollution and the different regions.

Conference participants also saw the need for more information sharing, both at the international level and within each country. They said future conferences including a broader constituency, such as this conference on Acid Deposition: Research, Information, Policy, would be a good beginning.

Controlling the problem requires consideration of the whole range of air pollutants and control methods. The brainstormers suggested controls should vary, depending on what componenets or air pollution are doing the most harm in a given area. These should include interim controls during which time long-term controls could be phased in. Burning low-sulfur coal, coal washing, and other least-cost alternatives should be considered.

Funding could include a combination of grants, loans and tax credits as incentives for quick conversion. Rate assistance should be considered as part of air pollution control, and include industries and commerce. Finally, conservation could be used as a control mechanism.

Overall, their ideas recognized the complexity of the problem and the need for a flexible, holistic set of solutions. Cooperation must always be a key ingredient.

REDEFINING THE GREATEST GOOD FOR THE LARGEST NUMBER IN THE LONG RUN

Norm Johnson
Oregon State University, Corvallis

Norm Johnson is the designer of the linear program FORPLAN, which is being used to develop all the forest plans on the National Forests in the United States.

IMPLICATIONS OF SELF-ORGANIZATION THEORIES FOR ENVIRONMENTAL ASSESSMENT AND MANAGEMENT: EXPLORATION AND EXAMPLE

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The basic ideas of self-organization theory and its relationship to systems theory are discussed. As a theory that deals with the generation of order and structure in complex, open, far-from-equilibrium systems involving nonlinear processes, self-organization theory is seen as potentially applicable to the understanding of sociobiophysical systems. An analytical framework based on principles from self-organization theory is used to analyze the situation in the South Moresby area of British Columbia.

ENVIRONMENTAL SCIENCE: A FOCUS ON RESOURCE MANAGEMENT - A PROJECT CREATED BY A UNIQUE EDUCATIONAL EXPERIENCE

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Beginning with a 1983 undergraduate freshman honors seminar in natural resource management, a team, primarily comprised of non-science majors, worked with faculty to devise a comprehensive research plan, sought and received grants for field work, case study research and undergraduate summer research fellowships. An environmental science textbook contract from Harper and Row Publishers followed in 1985. The methodology used provides an educational model for students and teachers, especially those who want to extend classroom activities through projects designed to help solve environmental and resource management problems.

EE in the Non-formal Realm

IMPORTANCE-PERFORMANCE ANALYSIS OF INTERPRETIVE PROGRAMS AND SETTINGS

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What do visitors to interpretive settings want? What are they being provided? These are only two of the crucial questions that must be asked about information systems related to interpretation/non-formal environmental education. As we move to a period of greater accountability, the effectiveness issue must be addressed in greater depth. One method of addressing certain aspects of effectiveness is importance-performance analysis.

Importance-performance analysis probes desires and satisfactions of the visitor. Many past studies have often focused on satisfaction with broad concepts such as a park, in general. There is a need to study the individual facilities and programs more closely and to ask: "How important are these features and programs to the visitor?" and "How well is the sponsoring agency providing the facilities and services?"

Importance-performance analysis was developed as a tool for market researchers (Martilla and James, 1977). Importance-performance analysis is based on the concept that satisfaction is a result of a preference for an object or service and judgements of its performance (Myers and Alpert, 1968). Thus, the target population is asked to rate certain attributes of the facility or service on its importance to the rater and on the organization's performance of the features.

Recreation researchers have recently discovered the technique's use in the evaluation of leisure activities (Guadagnolo, 1983; Mills and Snepenger, 1983; Warnick, 1983). The scale is relatively easy to administer and the results relatively simple to interpret.

The Importance-Performance Scale is based on the assumption that satisfaction is affected by both the importance of an attribute and perceived performance on the attribute. Designed for ease of transferring results into actions, the scale's end result is a graph indicating appropriate levels of action.

In this method, determinant attributes of whatever is to be evaluated, park-related leisure activities in this case, are presented as two identical lists. These form the basis for two Likert-type scales. On one scale, participants are asked to rate the attributes as to how important they are while on the other, they rate how well the program performs on them. An average value (either the mean or the median) for each attribute is determined for each scale. These values are then plotted on a graph with importance as one axis and performance as the other. The points will fall into one of four quadrants -- labeled "Possible Overkill", "Keep Up The Good Work", "Low Priority", and "Concentrate Here" -- indicating to administrators how best to use their resources to upgrade their

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programs (see Figure 1). The placement of the grid lines defining the quadrants is flexible allowing for program variations.

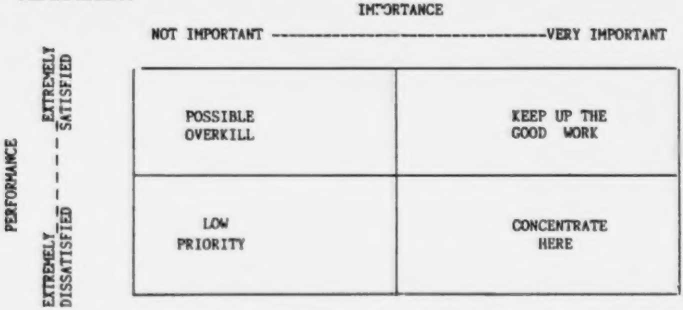

Figure 1: Conceptual Diagram of an Action Grid

By adding other questions, either open- or closed-ended, more information can be gained without adding significantly to the cost. For instance, if there is an indication, either from observations or the literature, that there is something that may possibly confound the data, information on that factor can be gathered. Demographic characteristics, group level characteristics, and information on past experiences can be used to create graphs of different groups for comparison. By asking a few well-stated, open-ended questions, the administrator may learn not only which attributes to concentrate on, but also how they may best be improved.

Martilla and James (1977) applied Importance-Performance Analysis to service features of an automobile dealership in an attempt to discover why some people were loyal customers and others were not. They summarized the technique's advantages in the following way:

> It is a low-cost, easily-understood technique that can yield important insights into which aspect of the marketing mix a firm should devote more attention to as well as identify areas that may be consuming too many resources. Presentation of the results on the importance-performance grid facilitates management interpretation of the data and increase their usefulness in making strategic marketing decisions (p. 79).

Although the technique has not been used frequently in the marketing field, it shows great promise as a measure of the effectiveness of interpretive/non-formal environmental education facilities and services. Even though promise is evident, further development, testing and validation are needed.

Field Test of Importance-Performance Analysis

Application of any new technique to a field different from the original design intent requires caution in application and care when interpreting results. Importance-performance analysis, designed for a profit-oriented market setting, but applied to a nonprofit non-formal education setting raises a major point of caution. Profit orientation seeks a return on investment and, in most cases, customer loyalty. In the nonprofit interpretive/non-formal environment education setting, the objectives are broader. Customer satisfaction and a willingness to pay with time and/or money along with a willingness to participate is only one measure of success. Two other measures must be considered -- the organization's ability to convey the messages set forth as objectives, and the ability of the resource to sustain the activity without irreparable damage to the resource. Thus, these points should be considered in reviewing the field test and when considering adoption of this technique for applied or theoretical research.

The field test reported herein sought to apply importance-performance analysis in evaluating a metropolitan park system in Ohio. The metropolitan park system entails fairly extensive urban nature parks and an established nature interpretation program.

Thirty-five items were determined to be the most important items to include in an importance-performance analysis to assess visitor perceptions and satisfaction with the park. These items are listed in Figure 2 below.

Figure 2. Variables Rated on Importance-Performance

1. Hours park is open
2. Location of park in relation to your home
3. Publicity for park programs
4. Variety of activities offered
5. Maintenance/cleanliness of park grounds and facilities
6. Enjoyment/entertainment value
7. Number of visitors in park
8. Number of parking spaces available
9. Helpfulness of park employees
10. Opportunity to view wildlife
11. Opportunity to see and study plants
12. Opportunity to get away from business or city
14. Safety/security of park
15. Availability/accessibility of nature/hiking trails
16. Nature/hiking trails easy to locate
17. Nature center/information center
18. Time of day or night of structured activities
19. Day of week activities are offered
20. Meeting area for activity easy to find
21. Opportunity to get involved in activity
22. Opportunity to socialize during activity
23. Activity presenter's personality
24. Ability to see and hear presenter during activity
25. Visual aids used in activity
26. Recreational value of activity
27. Educational value of activity
28. Activity relates to park's natural/human history
29. Activities structured for visitors with children
30. Placement of facilities within park
31. Variety of facilities available in park
32. Crowdedness of facilities

33. Ability to reserve facilities
34. Informational value of bulletin boards
35. Animal and plant information signs

Additional open- and closed-ended questions were asked of participants to add further meaning to the study. Due to the extensive nature of the full study, these data are reported elsewhere.

The target population included all park visitors and was sampled by distributing one survey form per vehicle, or one per group of people walking as they entered the park. Questionnaires were distributed in alternating fashion (i.e., the first car received an importance survey, the second a performance survey, the third an importance survey, etc.). All vehicles were directed to stop at the entrance and occupants were asked to complete the survey. Most vehicles stopped as asked and only a few refused to take the survey. The vehicle driver was given a questionnaire and pencil and told where to return the survey. A letter within the survey form explained the survey's purpose and gave complete instructions. As visitors left the park, they had the opportunity to return the survey. The option of mailing the form to the Metro Park office was also given. Overall return rate was 56 percent (n=488).

In this study, each completed questionnaire represents a case; therefore, there are many answers to each question. To make sense of the data or compare answers, the answers must be combined into one average answer per question. In this case, the average visitor answer is most important, although even extreme cases should be considered. The mean was used to represent the typical visitor.

The rating scale used provides ordinal data rather than interval data. Therefore, many authors, including the developers of importance-performance analysis (Martilla and James, 1977), would suggest using the median instead of the mean since, they feel, the median makes fewer assumptions about the data than does the mean. However, researchers have investigated the effects of failing to meet the assumptions and found that it has little effect on the outcome (Herrmann and Braskamp, 1970). Therefore, the mean is used in this study for its increased reliability and advantages in statistical inference.

In calculating the mean, all people answering the importance scale were combined and all people answering the performance scale were combined to give overall means for each feature on each scale. These means were used to rank the 35 scale features for each group and to plot the features on the action grids. Figure 3 presents the overall action grid.

The majority of the features fell into the two high-performance quadrants of "possible overkill" and "keep up the good work." Where the midpoint lines are to be placed is a parameter that should be set before the study begins; thus, a gray area exists for the judgment calls.

The action grid (Figure 3) simply provided the park system with a reasonable assessment of how people perceive the park.

Again, it is important to remember when examining the action grids from this study that the results represent only the views of the visitors. This is only one corner of the park resource triangle. Any actions taken must be tempered by a knowledge of the organization's goals as well as natural and cultural resource limitations. Visitor needs may not always mesh with organizational and resource needs (Hendee and Harris, 1970; Peterson, 1974). Therefore, this knowledge allows managers either to take appropriate action to match performance ratings to importance ratings or to explain why this cannot or should not be done. In situations where visitor needs are secondary to organization and resource concerns the negative impacts must be mitigated through public rationalization or alternative opportunities to meet the needs.

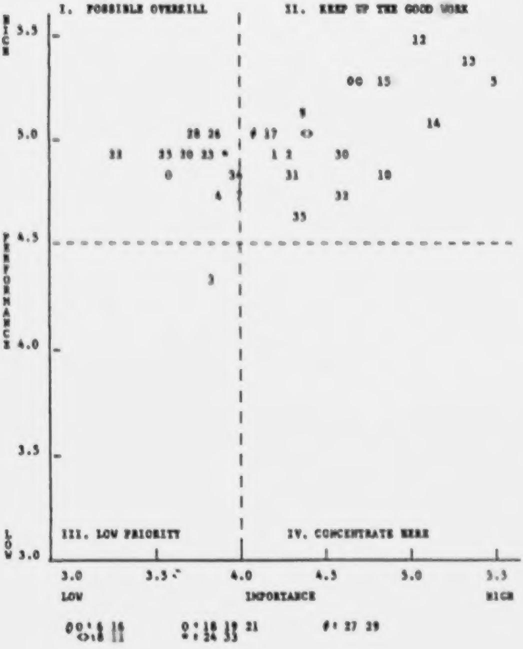

Figure 3. Action Grid

The action grids indicate that the Metro Park system is doing fairly well in its effort to satisfy visitors. The only topic to fall in the lower quadrants was publicity for park programs in the low priority quadrant. This finding may be interpreted as a mandate to cut back on publicity. On the other hand, the park system has limited publicity in the newspaper, a very limited direct mail program and has relatively low attendance at the park interpretive programs. Results should indicate that there is limited publicity reaching people who value that publicity.

Thus, like much of our social research, the findings tend to raise as many questions as they provide answers. Importance-performance analysis seems to do both.

Several suggestions for further research are suggested:

1. The meaning of importance needs to be defined. Importance has been equated with determinance in some studies (Myers and Alpert, 1968), while others stress importance is not necessarily determinance (Aaker and Day, 1980).
2. The exact relationship between importance and performance should be examined. Is there a causal relationship?
3. The differences between participant and nonparticipant perceptions need to be examined. While results from this study show no differences, past research indicates there should be observable differences.
4. The major reasons for visiting must be examined in more depth, as they may provide a valuable way to group visitors and determine the park's needs.
5. Finally, importance-performance analysis needs to be used in a variety of situations, using a variety of techniques. This is the only way its possible uses and effectiveness can be determined.

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THE NATURE SPECIALIST IN CAMP

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Every summer when the academic school year closes, approximately 5 million young people attend about 15,000 resident and day camps in the United States and Canada. What a wonderful opportunity exists to teach the principles of EE to those youngsters! Summer camps can be the very best places to learn about the natural environment for many reasons. In the first place, the time of the year is ideal, since nature is at its fullest during the very months that camps are in session. Trees are leafy, meadows buzz with life, ponds, lakes and streams teem with aquatic organisms, the woods are shaded and the fungi apparent in their fruiting stages. Insects hum and pollinate flowers, wildflowers are abundant and the weather is warm enough to explore the world of nature. Summer camps are ideal places for EE too. The atmosphere of camp is relaxed and recreational. Everyone is on a first-name basis, people dress casually, games are acceptable means of teaching, and discipline problems are minor or non-existent. There are no tests, marks, report cards, or defined curricula to create restraints. It is easy to help youngsters to love nature in such an atmosphere.

Furthermore, most camps are located in rural areas, away from the concrete world that is usually the home for the majority of our populace. Children are in a country setting where they can touch nature directly on a daily basis for the duration of the camp season. The study of the natural environment belongs in all camps and should be a major program of every camp.

What then should a quality nature program in a camp comprise? If you asked most camps to describe their nature program, the reply would probably be something akin to: "Well, we take our kids on nature hikes and we keep animals like snakes and frogs for the campers to see and handle." Now, there's nothing wrong with nature hikes and keeping animals, as long as that is NOT the entire program. The nature program in camp can be so much more. A well-prepared specialist can convey the essentials of EE in a typical 8-week camp session. Certainly, at the very least, the opportunity exists to increase the awareness level of the children in whatever time they spend in camp, even in the 2-week session. A good program emphasizes a variety of approaches to the teaching of EE. It can consist of hikes and collections plus nature crafts, contests, games, discoveries, animal rearing, gardening. It can challenge the intellect, appeal to the senses, inspire the aesthetic, touch the spirit. It can and should be full of surprises, all done with a light touch to promote a lifelong sense of awe and the associate pleasure with nature learnings (not so easy to accomplish the latter in many school settings).

A quality nature program should also have its own place in camp, not just the outdoors itself. There should be a room set aside for carrying out the activities and for creating an attractive and inviting place, sort of a mini-museum or nature center with things to look at and do that spark the curiosity of youngsters. The room could house the collections of organisms and be a lab where investigations can be carried out.

Planting and caring for a garden should also be a part of a good nature program, especially in these times when we are so far removed from our source of food that young people cannot readily see the connection between soil, water, and plants and what appears on their tables.

The entire approach to teaching nature in a camp setting should be educational and important, but mostly fun. Often the impact of such experiences has an everlasting effect on the camper; it is in just such a setting that a lifelong love of nature is started and nurtured.

How can educators help to implement a good camp program? As I see it, in order to have an EE experience in a camp setting, there are three basic requirements:

1. A deep commitment on the part of the camp director is paramount. Those who create the policy, establish the overall philosophy, hire the personnel, enroll the campers, provide a budget....they have to want it and be willing to put their support and resources behind it.
2. A person to effectively carry out the program is also required. The nature specialist has to be someone who genuinely cares about the environment and wants to share that caring with young people. The person further needs to be enthusiastic about nature (and life in general) and comfortable in the formal setting of camp.
3. The tools with which to carry out an effective EE program must be readily available because camp time is very concentrated. The teacher does not have 40 weeks to present and develop concepts as is true in school. It's tougher to learn as you go along because the summer will be over in just a few weeks.

Some of the problems I have encountered over the past few years in my attempts to recruit, train and place people as nature specialists in various camps are:

1. Getting camp directors to establish quality nature

programs. It is difficult to convince camp directors that nature must be accorded the same status as the other popular programs. Nature study is not a frill, a minor, a maybe or an also....it must be right up there with swimming and other sports. Directors must promote nature to their campers in their brochures and to parents.

2. Camp directors must then be convinced to support, morally and financially, the nature program. They must pay someone who will do the proper job of enticing the best people. They must provide a place and money for equipment.
3. Getting good personnel to fill those jobs is a must. Because a summer-long commitment is usually required, the nature specialists are usually either teachers or students who are available for that length of time. Many teachers do not want to spend their summers teaching kids....they are tired of children and want to get away from them for the summer. College students, too, do not seem so eager to teach children for the summer. Indeed, many camps have given up their attempts to have a decent nature program because they were not able to find the proper personnel.

I feel it is the responsibility of the academic community to prevent this from happening. Our youngsters need to have effective role models to learn from. Those who teach the older students should be encouraging their pupils to share with children during their summer vacations from college. We need to build a cadre of dedicated youth to spread an important environmental ethic and message. I intend to carry my crusade as far as it will take me....to promote and establish a quality nature program in every camp. You are welcome to join me in this noble endeavor.

NOTE: Lenore Miller is the author of THE NATURE SPECIALIST, recently published by the American Camping Association.

INTERP: A COMPUTER SIMULATION GAME OF THE INTERPRETIVE/NON-FORMAL ENVIRONMENTAL EDUCATION PLANNING PROCESS

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If the field of interpretation/non-formal environmental education is to keep pace with and take advantage of the rapidly changing new technology, computers must be an active part of our professional endeavors. Tomorrow's interpreters must be provided with a sound foundation in data processing so they can use machines to perform their jobs better and more efficiently.

Interpretation/non-formal environmental education is an area of study yet in its infancy. One of its goals is to improve the effectiveness with which information is presented (Wagar, 1976). The tremendous number of variables involved in this endeavor is staggering. Sophisticated computer modeling and data analysis can organize this mountain of information to

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manageable proportions. Use of electronic information processing is necessary for interpretation/non-formal environmental education to formulate and test its theories.

In addition, computers can be powerful learning tools. A machine can be a patient yet exacting teacher, creating artificial environments in which students can test their wings without fear of falling. As students are presented with more and more information to assimilate, the computer can again be of service.

This presentation deals with one facet of the beginnings of the collaboration between environmental/non-formal environmental education and computer science: a computer simulation game known as INTERP.

The objectives of the INTERP game are to: (1) Demonstrate the power and uses of computers to students and practitioners of interpretation/non-formal environmental education; (2) Show how computers can be used for modeling in the realm of interpretation/non-formal environmental education; and (3) illustrate how computers can be used as learning tools in interpretation/non-formal environmental education.

By patterning the game after the interpretive planning process (Bradley, 1976), it was hoped that a teaching instrument would develop which would sharpen skills of direct use in the field, that students of interpretation/non-formal environmental education would learn that computers can be simple and enjoyable to operate, and that future professionals in interpretation/non-formal environmental education could see how computers can be used for modeling.

INTERP is designed to be easy and fun to play. All commands consist of one or two key strokes, and the screen leads the player through every step of the game. If a mistake is made, special screens formatted to inform the player of such errors guide the player through the next move. The computer monitors all details, allowing the player the freedom to concentrate on the issue at hand.

Before the simulation game begins, a number of introductory screens describe the scenario and explain how the game is played. When the computer formats the main playing screen, the actual game begins.

The player is an interpreter/environmental educator who has just been assigned the task of writing an interpretive plan for a site. The interpreter/environmental educator and supervisor have met and carefully selected 20 items from the site's master plan for which the greatest need currently exists. A limited budget for the next fiscal period prevents all of the items from being implemented. The player must draw up a plan -- within a given deadline -- which includes as many items as possible.

In addition to monitoring the budget and time limitations, the player must be constantly aware of the effect each choice has on the three components of interpretation: the site (resource base), the organization (agency sponsoring the interpretive programs at the site), and the visitor (Mullins, 1980). The player may either balance the effects on all three components or maximize the benefits accrued to one of the entities.

At the top of the screen, the player will always be given a current status report on time and money spent. To learn more about any item on the main playing screen, the player must key in the item's corresponding number. A new display then describes the item in more detail and lists several ways in which the item may be implemented. The player may choose to proceed with implementing this item, or may request further information, telling the computer to perform further "studies". Such studies resemble investigations such as visitor surveys, cost/benefit analyses and environmental impact studies, and further educate the player about the effects each decision will have.

After examination of several items and review of as many "studies" as are necessary, the player eventually builds the interpretive plan.

At this point, the computer evaluates the net effect of all decisions made and decides whether or not the player met the objective of either balancing the three components of interpretation or maximizing one of the three. If the objective was met, an efficiency rating between 0 and 100 is displayed.

Every game session in INTERP is different since the program randomly generates the budget, deadline and items which may be utilized in the interpretive plan. Over 73 septillion different games are possible. Random events occur throughout which surprise even the veteran player.

INTERP was developed on a Radio Shack TRS-80 computer owned by the School of Natural Resources at The Ohio State University. The machine has 32K of memory (32,768 storage locations) and double disk drives; each drive stores 83,060 bytes. A local printer is also connected to the system. The computer instructions for the INTERP program were written in BASIC (Beginner's All-Purpose Symbolic Instructional Code) language since BASIC is fairly universal, allowing the game to be played on different makes and models of computers.

The computer's master list of 30 items keep the game's fictitious site as general as possible. The menu of items were developed based upon investigation of interpretive sites, consultation with professional interpreters, and review of interpretive literature.

To fulfill the objective of making INTERP a learning tool, it was necessary that the data related to the 30 items reflect the "real world" conditions. Investigations of catalogs, price lists, and telephone calls and interviews yielded the cost of each option to be offered. The amount of time necessary to complete the various studies was obtained through direct measurement or reasonable extrapolation from similar situations.

To determine the impact of each option upon the components of interpretation, 15 professionals in fields related to the game (environmental interpretation, computer science, parks and recreation administration, modeling, and game theory), provided input via a survey form. Each professional was asked to evaluate the impact the options would have upon the site, the sponsoring organization, and visitor; the results were averaged.

INTERP emphasizes the processes of interpretive planning. Data and situations presented to the player are entirely flexible and can easily be changed. The player's task and the primary thrust of the game is to make decisions based on the data available.

The major objective of this work was to develop a computer program that would demonstrate to interpreters/non-formal environmental educators the power and uses of computers for modeling and learning. Initial feedback indicates this has been accomplished. Much positive reaction to the game has been received, even from students previously apprehensive about the use of microprocessors. Two researchers are now incorporating aspects of INTERP into their own programs, and several professionals have expressed real interest in the game.

However, on the negative side, some reviewers have indicated that the model on which the game is based is inaccurate. Instead of balancing three components of interpretation, some individuals believe four components should be juggled: the organization, the site, the visitor, and the budget. Another individual suggested that the "organization" component should be subdivided into two components: public relations and money management.

Such feedback shows that the basic design of the game is sound, since INTERP could easily be modified to accommodate all of the suggestions received. Also, the constructive criticism shows that ideas are already surfacing as to how the game could be improved. The game has the potential to serve as the introduction and inspiration it was meant to be and encouraged the development of new and better projects in the future.

INTERP is intended to serve as the foundation for many other projects. Since this study involved formative research, further work will undoubtedly yield significant discoveries and improvements. Consider, for example, the huge number of possibilities opened up by the use of graphics terminals -- video devices capable of displaying line drawings, pictures and photographs. Items could be shown instead of described. For example, maps of the site could be shown, and players could be asked to pinpoint locations for new roads, trails, and interpretive facilities. Concepts of site planning could be incorporated into the game, and data presented using detailed graphs. Planners in interpretation/non-formal environmental education will be able to experiment and act only after seeing the ramifications of their decisions.

This goal is by no means unrealistic; the necessary technology exists today. It is up to tomorrow's professionals in interpretation/non-formal environmental education to achieve this goal.

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VOLUNTEERS -- THE VITAL LINK

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The importance of volunteers is being widely recognized by environmental education professionals. Well-trained volunteers can help increase the efficiency and the effectiveness of an organization by helping out behind the scenes, increasing teaching capabilities, and providing a strong support group.

Key elements that are necessary to develop a strong volunteer network are designing appropriate job descriptions, developing a successful recruiting campaign, and conducting a volunteer training program.

Volunteer Job Description

Prior to writing a job description, the agency should decide where volunteers are most needed, the training involved, costs, and supervision. Once a plan has been established, the volunteer job description should be developed with paid staff input, since it outlines the relationship between the volunteer, the paid staff, and the organization. It should also outline the person's duties and responsibilities; including their supervisor's name, dates of duration, tasks to be accomplished, and short term goals. It is also important to give each volunteer job a title.

The tasks a volunteer is to accomplish should be stated in the job description as specific objectives. Using clear work objectives eliminates confusion for both the volunteer and the staff. These work objectives can then be used as a guideline when reviewing a volunteer's performance.

Recruiting Volunteers

Volunteers have become increasingly difficult to recruit over the past five to ten years. This is due to changes in both our social and economic environment, such as married couples in which both the husband and wife work, families spending a greater amount of their spare time on recreation, and individuals becoming more selective regarding their volunteer placement.

When developing a recruitment program, it is important to keep in mind the type of volunteers you are looking for (skills, time commitment, age), and the reasons why people volunteer. It is best to direct your appeal to specific population subgroups, such as senior citizens, single adults, or teens, rather then conducting a general campaign. This not only helps you find the type of volunteer you are looking for, but also allows you to appeal to their reasons for volunteering. In a study conducted by Anthony King on the reasons people give for volunteering, it was found that people volunteer in order to satisfy certain psycho-social needs, like the need to help others, to meet people, and to gain personal enrichment. King found another main reason people volunteer is to learn new job skills and to receive valuable training. He also found that people rarely gave just one response for why they volunteer, and most often cited a variety of reasons. Knowing what motivates people to volunteer can help you in promoting and targeting your volunteer program.

Volunteer positions can be promoted through a variety of media, including newspapers, radio, and flyers. Other means of advertising include telephone calls, speaking for civic groups, and an open house.

When you are speaking to potential volunteers directly, you should be prepared to describe the job responsibilities, and how their services will benefit the agency. You should also be able to answer any questions regarding the agency's goals and activities. Some volunteer positions are more difficult to fill than others, but careful planning and timing will secure the best overall results.

Training Volunteers

A training program for volunteers should be established prior to the recruitment phase. Workshops and materials developed to be used with adult volunteers should take into account the characteristics of adult learners. Adults appreciate a clear explanation of the material being taught, and expect the workshop leader to be experienced and knowledgeable about the subject. They are also interested in applying their own background and information, providing an atmosphere for mutual exchange.

It is best to employ a variety of teaching methods, for example group discussions, use of audio-visual aides, and role playing, when working with adults. Some individuals learn better from one form of teaching over another, and it is important to be aware of what is working and what the audience is comfortable with.

Training volunteers is a continuous project, beginning with the interview and carrying on through orientation, skill workshops, supervision, and evaluation.

Summary

A successful volunteer program will require a great deal of time and energy in the recruiting and training phases, and will also require on-going review. A volunteer program should be flexible, and change with the needs of the volunteers, the staff, and the agency.

Once volunteers are trained, it is important to keep them motivated in order to retain them. Mary Rodriguez, who conducted a study on volunteers for the American University, found that several factors are important in keeping people interested in a volunteer program. She suggests four items to include when working with volunteers: acceptance and support of the volunteer program by the paid staff, equality with the paid staff, recognition, and provision for interaction among volunteers. Volunteers, like paid employees, should feel that they are a part of the organization. They should be appreciated and know that what they are doing is worthwhile.

Volunteers benefit an agency by supplementing paid staff, often providing an expansion of services that would not otherwise be possible. They bring with them a wealth of ideas, skills, knowledge, and insight. Although the services from a volunteer program are not "free," the benefits to an agency from the volunteers are likely to far outweigh the time and costs involved.

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THE IMPACT OF A RESIDENT THERAPEUTIC CAMP ON SOCIALLY/EMOTIONALLY DISTURBED CHILDREN AND THEIR THERAPISTS

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This project represents a cooperative working relationship between Children's Hospital Guidance Centers (Columbus, Ohio) and the School of Natural Resources at The Ohio State University.

Many of the children serviced by the Guidance Centers are the products of disruptive homes and physical, emotional or sexual abuse. They may also suffer the effects of limited income or poverty.

For children lacking a positive parent model and effective coping skills, therapy has been used to reverse the trend which may hamper their future lives. In instances of an initially poor prognosis, therapy has been shown to improve self-concept as well as peer and family relationships.

The goal of this project was to assess: (1) the impact of a therapeutic camp experience on a child's self-concept and behavior; and, (2) whether or not a therapist's treatment skills and therapeutic investment are enhanced through a camp experience.

The assumption behind the project was that such an experience could prove therapeutic for the child, i.e. reducing symptomatology, and increase the professional investment of the therapist.

The value of camping programs for children with social, emotional or behavioral problems has been explored with generally positive results by Byers (1979), Griffin (1981), Burdsal and Force (1983) and Lane (1983). The out-of-doors also offers a therapeutic setting separate from everyday life in which the individual may experience success in activities that previously were negative experiences (Nearingburg, 1982). Chase (1981) reports success of the Colorado Outward Bound School in increasing self-esteem, sense of responsibility and resolution of locus of control issues.

These non-traditional therapeutic approaches all utilize outdoor and environmental education concepts and methodologies and are conducted in outdoor and/or camp settings. The counselors are generally specialists in specific outdoor education areas. In most of these programs the children are placed in a new environment with unfamiliar people in supervisory positions. No concerted efforts are made to continue environmental therapy or communication after the experience. This project offered the added dimension of using clinical staff from the agency treating the children as couselors/therapists during the resident experience.

In April of 1986 seven therapists began training in outdoor/environmental education methodologies. This training consisted of 20 hours of classroom sessions and a 24-hour field practicum at the resident facility. Topics included basic camp procedures natural history identification, and "hands-on" activities.

The therapists in the project were characterized by the following demographic variables. They were self-selected to participate. Most were under thirty, single, with no children of their own, held a masters degree in social work and had been working professionally 4 years or less. Of particular importance, all had some personal interest in the outdoors and all indicated some positive camp experince as a youth. These characteristics were not evident in a group of therapists used as a control population.

The study population of clients consisted of 34 emotionally disturbed children. The population was evenly split between latent (age 7-9) and adolescent (age 9-12 yr) groups with separate camping sessions for each. The groups were evenly divided between male and female. All participants were clients of Children's Hospital Guidance Centers. Each was referred by a therapist who sought parent/guardian permission. Both behavior and diagnostic variables were considered when making referrals for the camp program. Appropriate categories included: (1) Behavior - rebellious at home, won't follow rules, shy, withdrawn, stealing, shoplifiting. vandalism, substance abuse, lying, attention deficit disorders, school attendance problems, poor academic performance; (2) Personality Traits - poor self-concept, insecure, anxiety reactions, depression; (3) Etiology - separated, divorced, widowed, remarried parents, adoption, learning problems, victims of child abuse, medical problems or alcoholic parents.

Children with severe behavior disorders, those diagnosed as having separation anxiety, being firestarters, or schizophrenic were not viewed as appropriate for the camp experience.

The research component of the project addressed the impact of the camp experience on clients and therapists. Two instruments were administered to the clients and a similar control group prior to camp, at the beginning of camp, at the end of camp and one month later. The 80 item Piers-Harris Self-Concept Scale (1985) was used to reveal how clients felt about themselves. A second instrument, the Revised Behavior Problem Checklist (Quay & Peterson, 1983) was completed by parents and therapists. This checklist rates 85 problems commonly seen in children and adolescents.

Four different instruments were administered to the therapist and a similar control group during the training, camp experience and after the camp. An open-ended demographic information questionnaire collected information about each individual including their feelings about the success of their therapeutic sessions.

A Clinicians Confidence Questionnaire was developed to gather attitudes and opinions regarding resident experiences. Clinicians responsed to a 5-point Likert scale (Strongly Agree to Don't Know) for each of 31 questions. Examples include: "I often wish I could expand my therapeutic technique.", "I can effectively use the outdoor environment with clients.", and "I am anxious about daily living with clients."

Each participating therapist also completed several administrations of the Multiple Affect Adjective Checklist (MAACL) (Zuckerman and Lubin, 1965). This instrument measures levels of anxiety, hostility and depression.

Additionally, each therapist completed a Clinicians Self-Report at the end of the resident experience. They were asked to respond to questions concerning training and the camp experience as well as their feelings about the effectiveness of the therapeutic camp.

Results from preliminary data analysis suggest only a minor change in clients. This was anticipated due to the short length of the experience, unfamiliarity with administering the instruments, and the need for additional followup. The information does suggest, however, that the instruments selected can be used to measure client changes in resident programs.

Preliminary analysis of instruments administered to clinicains suggest some important implications regarding therapeutic camp programs. Responses to the demographic questionnaire indicate a set of characteristics different than the control group. Most noticeably the participating clinicians expressed a personal interest in the outdoors and a positive camping experience as a youth. Neither of these items appeared in responses of the control group.

Responses to the Clinicians Confidence Questionnaire from the pretraining administration to the end of camp administration show a positive change in 13 of the 31 questions. The most dramatic changes deal specifically with the therapists, i.e. "I believe a resident program can help me understand co-workers better.", "I want to conduct future sessions in the outdoors.", and "I know several techniques I can use in the outdoors." These results suggest that the professional investment of the therapist is enhanced through the resident camp experience.

Analysis of the MAACL administrations show a pattern similar to that established by previous groups where this instrument has been used. The initial administration at pre-training scores in the stage fright range but drops to normal levels by the end of training sessions. During the first resident session there is a score higher than posttraining increasing during the experience, but not peaking as high as the pretraining level. During the second session the initial score starts near the normal level at posttraining, again increasing during the experience but not peaking as high as during the first session.

These results suggest that the pace and activities of a resident experience have a wearing effect on staff. This must be taken into account when designing a program. Also, as each new resident group is encountered, the confidence level of the staff increases. They have a better idea of what to expect from themselves, other staff members and clients.

Responses to the Clinicians Self-Report focused heavily on the benefits of the experience, including: the spectrum of interactive possibilities, having a group of therapists working together to solve problems and be supportive of each other, the possibilities for follow-up treatment with clients, and greater sensitivity to individuality, specialness, limitations, and how to work with complexities.

Further analysis will be undertaken to determine more specifically how environmental education and the therapeutic use of the outdoors can have a positive impact on clients, therapists and the relationship.

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WILDERNESS MANAGEMENT ISSUES: NATURAL RESOURCES AND ENVIRONMENTAL EDUCATION DEMONSTRATION PROJECT

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We in the United States first institutionalized a totally new attitude to wilderness and its place in modern society. The idea of valuing wilderness for ecological, cultural, spiritual, scientific and recreational values, and of preserving it as an enduring resource for present and future generations was promoted.

In 1964 the U.S. Congress passed the Wilderness Act, formally establishing the National Wilderness Preservation System. First introduced in 1958, seven years of debate and 65 individual bills were introduced before the system was formalized by Congress. The Act defined wilderness as a place where people are visitors who do not remain; an undeveloped area of "federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions"..."with the imprint of man generally unnoticeable."

Today there are 441 wilderness areas in 45 states totaling about 89 million acres of federal lands. Four federal agencies take care of and manage these lands. Wilderness acreage includes almost 12 percent of the federal lands in America, and about 3.5 percent of the entire country.

Wilderness areas represent a vast ecological and cultural heritage for present and future generations of Americans to appreciate and enjoy. More Americans than ever are visiting wilderness areas. The growing popularity of these lands is making it difficult to keep part of these wilderness areas wild.

Problems arise when conditions in the wilderness start to approach what the manager and the public think is unacceptable. In fact most management efforts focus on impacts from recreational use, primarily on campsites and trails, which in turn tend to cluster around the area's major attractions. Though campsite and trail impacts occur on a small part of any wilderness area, they are very visible to visitors because they occur where use is heaviest.

Keeping the wilderness wild means preserving the natural character of the land, while providing outstanding opportunities for solitude and unconfined primitive recreation for users, as required by the Wilderness Act. The issue we faced in preparing educational materials dealing with wilderness was maintaining the qualities that make wilderness what it is--keeping the wilderness wild. This is the challenge of wilderness management.

Education as a Tool in Wilderness Management

There are two primary types of tools available to wilderness managers, they can be classified as heavy-handed (regulatory) versus light-handed (indirect techniques and education). While most managers believe that regulatory methods are more effective (Bury 1980), the majority of managers and visitors prefer to use light-handed management techniques to prevent problems from becoming severe enough to require regulations (Anderson 1985).

Several studies of wilderness users in the Northern Rockies found very low knowledge level of visitors concerning wilderness use techniques (Lucas, 1974; Hill, 1975; Young, 1978; Fazio, 1979; Robertson, 1981). These studies emphasize the need for more effective communication with visitors. Dispersed recreation and environmental research has shown that information and knowledge significantly influence attitudes about environmental issues (Berrier, 1981; Perdue, 1981; Robertson, 1983). Robert Young (1978) found that the knowledge people have about wilderness has a significant influence on their opinions concerning wilderness. Information had more influence than any other characteristic, including age, education, income or residence. He found information also improves the level of approval of the wilderness concept (Young 1978). In a study of Boy Scouts and wilderness camping techniques Dowell (1985) found that there was an overall improvement in wilderness knowledge, skills, and behavioral intentions after exposure to a wilderness education program (Dowell 1985).

Rachel Robertson found that information on wilderness use techniques not only affected attitudes, but these attitudes were translated into behavior modification to protect the wilderness resource (Robertson, 1982). Other studies demonstrated the effectiveness of information in altering backcountry behavior (Lucas, 1981; Brown, 1982).

Studies on the effectiveness of different methods and techniques of educating wilderness users are limited, and more research is needed, but there is no doubt that education will play an important part in wilderness management efforts in the future.

Purpose & Summary of Project

In October, 1984, the Wilderness Institute at the University of Montana entered into a contract with the Washington Office of the U.S. Forest Service to develop the first demonstration project to teach a natural resource issue to agency employees and the public. The Natural Resource and Environmental Education Program (NREE) is a new approach to public education by the Forest Service emphasizing natural resource issues on individual National Forests. The goals of the project included collecting and organizing information, and developing educational activities and audio-visual aids to demonstrate a method of teaching the public about a natural resource issue.

A four-part education module was developed on the issues of wilderness management in the Bob Marshall Wilderness Complex (BMWC). See Figure 1 for a summary of education products developed through this contract, and the target audiences they were directed toward. The four parts include:

1. Background literature, educational materials, and supporting information on wilderness management of the BMWC.
2. Classroom and field trip education exercises and learning activities on wilderness ecosystem management, written for fifth grade students.
3. Visually-oriented material, including a slide tape program, notebook, brochure and fact sheets, directed at adult audiences.
4. References and source list for background literature, educational materials, and supporting information gathered and indexed throughout the project, supplemented by an annotated bibliography.

The major management topics that we targeted for the project were: (1) Background, history and development of philosophies and values that led to the creation of the wilderness act. (2) Legislative history, policy, and regulations governing wilderness and the methods used by agencies to manage wilderness. (3) the natural characteristics of wilderness ecosystems. (4) Wilderness skills, etiquette, minimum impact techniques, proper equipment, health hazards and safety needs.

Overview of Educational Products

We produced several products to be used as graphic aids for wilderness education efforts, including:

- A 9 page brochure summarizing the issue of keeping the wilderness wild, and wilderness management.
- A 3 ft. x 4 ft. map of the National Wilderness Preservation System, showing the location of all areas in the system as of December 31, 1984. The back of the map includes a tabular listing of information on all areas in the system.
- A series of 19 fact sheets on wilderness topics, with extended reading lists.
- A 15 minute narrated slide tape program summarizing the major issues of wilderness management, designed for adult audiences, college courses, civic group presentations, etc.
- A booklet designed for inexperienced wilderness visitors or the first time users of the wilderness. The guide includes historic information and photos, a section on the natural history of the wilderness with plant and wildlife checklists, and a section on wilderness use skills, and "no trace" camping techniques.
- A portable table and wall display prepared to accompany the slide show, or to be used alone at conferences, county fairs and other public events. The display includes graphics, photographs and illustrations with accompanying text, describing the major issues of wilderness management.

Portions of the contract called for educational materials and activities directed specifically for fifth grade students. A series of exercises were developed for classroom and field trip settings. Accompanying the exercises are a filmstrip titled "A Timeless Journey," a lab exercise with role playing in wilderness management, and a wilderness management/appreciation game with game-board.

We gathered a large collection of information on the issues of wilderness management, particularly as they relate to the Bob Marshall Wilderness Complex. A 290 page written summary of this collection was prepared and published to provide reference sources for further education activities beyond the scope of this project.

The collection itself remains available as a resource for educators, students, managers, interested groups and individuals. The collection includes the following components: - A computer database bibliographic file with keyword search capability on wilderness management including research and popular articles, books, dissertation, reports, and brochures - A statistical and descriptive computer database on the 445 areas in the National Wilderness Preservation System; - A collection of written material, including roughly 1,500 articles, research reports, management plans, federal laws, policy statements, brochures, maps and other supporting documents that relate to management of wilderness; - A collection of information on environmental and wilderness education centers across the United States, and samples of curriculum and interpretive materials distributed through these centers.

KNOWLEDGE, ATTITUDES, AND BEHAVIOR: EVALUATING THE EFFECTIVENESS OF AN ENVIRONMENTAL EDUCATION/CULTURAL HERITAGE PROGRAM AT THE BAILLY-CHELLBERG HISTORIC SITE, INDIANA DUNES NATIONAL LAKESHORE

Joseph Passineau
South Dakota State University, Brookings

"Knowldege, attitude and behavior change is an often cited objective of environmental education/interpretation programs. An experimental research design utilizing ten separate measures of knowledge, attitude, and behavior was used to determine the effectiveness of a NPS environmental education/cultural heritage program conducted at the Bailly-Chellberg Historic Site at Indiana Dunes National Lakeshore. 433 area grade school students, representing 23 different groups, participated in the two hour conducted program and interpretative walk. Following the program, experimental groups scored significantly higher that control groups on two of three knowledge tests, on attitudinal measures indicating support for the protection of park and related natural resources, and on measures of intention to behave appropriately. In measures of behavior, participating students picked up about 80% of all the planted litter, and no student discarded souvenir button envelopes along the trail. Activity or lecture treatment programs and size of group had no apparent effect on knowledge or attitude scores, but activity groups did pick up more litter. A significantly greater number of control group students (41%) returned post cards requesting additional information than did treatment students (27%). Correlations among measures of knowledge, attitude, behavioral intention, and behavior varied greatly with strong positive correlation among knowledge tests and behavioral intention tests, less correlation between knowledge and attitudes, and no significant relationship between the paper and pencil measure of knowledge, attitudes and behavioral intention with the observational measures of litter behavior and rate of postcard return.

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DEVELOPING A PLAN FOR SUSTAINABLE RURAL COMMUNITY DEVELOPMENT

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West Virginia University

A plan for sustainable rural community development was developed as a group project for a graduate seminar in technology and community development at West Virginia University during spring 1986. The plan offers an alternative approach to small town economic development based on the concept of environmentally sound, long-term development put forth by Lester Brown and the Worldwatch Institute (Brown, 1981; Brown et al., 1985). The components of the West Virginia plan are an overview of the Mountain State's natural and human resources, an explanation of the underlying philosophy of ecological sustainability, methodology for selection of appropriate technical means for community development, and guidelines for plan implementation at the local level including suggested public policy incentives. Following revision and final editing the plan may be published and distributed to West Virginia legislators, state and local officials, and other citizens involved in community development.

Though this sort of planning exercise could be applied to any region, the approach is particularly applicable to West Virginia with its high rate of unemployment, low per capita income, traditional reliance on extractive industries, long-standing exploitation of natural resources by outside interests, flagrant environmental degradation, and preponderance of small communities (only 15 cities have populations in excess of 10,000). These factors have led to comparisons between West Virginia and Third World nations in terms of economic development and environmental quality (Giardina, 1985). The decline of West Virginia's important coal and steel industries, combined with major damage in 29 of the state's 55 counties by the November 1985 flood, make this an ideal time for new initiatives in community development.

The plan was developed through a team approach by the seven graduate students in the seminar and the instructor, Dr. Paul DeVore. The students came from a variety of backgrounds, including industrial arts, public administration, landscape architecture, environmental science, and technology education. Throughout the semester the seminar participants read and discussed literature on community development, appropriate technology, and the relation between economics and environmental quality. Guest speakers with experience in community development of West Virginia and the surrounding region addressed the seminar concerning past successes and failures as well as current development efforts. The latter half of the semester was principally devoted to outlining, researching, and writing the community development plan; groups of 2-3 students took responsibility for completing each section of the document.

Development and dissemination of such a plan can serve as an environmental learning tool on three levels. First, and most obviously, the planning process is an educational experience for the students who develop the plan to acquire a basic knowledge of the links between economic development and the environment, and to apply this knowledge to the chosen planning area. A group of students with diverse backgrounds, such as the group that developed the West Virginia plan, bring complementary skills to the team planning process and hence are encouraged to learn more about one another's disciplines. Second, the plan may open the eyes of state and local policymakers by raising awareness of the interrelations between technology, environmental quality, and economic well-being. This heightened awareness will hopefully lead to consideration of novel approaches to community development. Third, the plan can be an impetus for grassroots efforts by local entrepreneurs or co-ops to spread the philosophy of environmental sustainability through application of this philosophy to their business ventures and lifestyles.

This community development planning concept would seem applicable as part of the curriculum in a wide range of environmental education, social science, and even natural science classes at either the graduate or advanced undergraduate levels.

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TEACHING NATURE THROUGH THE ARTS

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Imagination is a primary ingredient in the development of thinking skills. Yet children in our culture are many times deprived of opportunities which encourage creative imagining and inventiveness. The leisure required for imagining is curtailed at an earlier age with each generation and has less and less effect on our childrens' early development. The products of science and the tyranny of structured time schedules with organized activities have insulated and isolated people from the natural world so that understanding of the processes of knowledge are vicarious at best or altogether unlearned. The purpose of the Nature Through the Arts program is twofold: to exercise imagination and to do so while reconnecting people with their natural environment. The ultimate goal is to enkindle affection for the planet that sustains our life. Children who love the earth and understand how it works will be more likely to grow to adults who are able to exercise wise stewardship based on full understanding of the results of the decisions they make regarding the environment. The activities are designed primarily for pre-school and early elementary-age children, but the principle can be adapted to any age level. For most of the activities, an outdoor setting is preferred, though not essential. The particular media chosen for this workshop are music, sculpting and poetry.

Music

Classical music is always used in one part of the program. Most young children do not listen with any previous interpretation. The music chosen does not have to have a nature title, although pieces like The Flight of the Bumblebee by Rimsky-Korsakov have great merit in certain settings. The piece chosen for the NAEE Conference was the Karelia Suite, Op 11 by Sibelius. The youngsters should sit in a circle with their backs to the center. If the activity is done outdoors, they can keep their eyes open; if indoors or in a developed area, it is more helpful if they close their eyes. The leader describes a natural scene; in this case an open field. "You are seated at the edge of a great forest. Before you is an open field with tall grass. It is a beautiful day. Look at the sky, feel the air against your body. As you listen to the music, watch the field come alive. Notice all the living creatures who present themselves. Watch what they do. The music will play many parts. You be the director." The music is played. At the end of the piece, the children are invited to describe all the animals, birds, insects, plants and their interactions; how they felt, what they liked best, etc. The sharing can be expanded to dramatization if time permits or at another time. Some schools have developed the activity into a class assembly.

Sculpting

First discuss the essentials of habitat. Make sure the children understand the need of all living things for food, water, shelter and space. Distribute a portion of potter's clay to each participant. Ask them to mold some creature's nose or beak; a foot; an ear. Finally, ask the children to mold an animal that has never been seen on the earth before. They will have to decide its name, where it lives, what it eats, how it gets its food and some of its behavior. At the end of the activity, the children share ideas about their creature. The clay can then be fired and taken home to assure a more lasting impression.

Poetry

When presenting a story or a poem it must always be narrated. The dramatics and eye contact are essential in drawing children into the mood of the piece. At the end of the narration, the leader draws from the children all the images that were involved in the piece. In the poem, "Jabberwacky" by Lewis Carroll, for instance, they would remember the Jabberwock, the Jubjub bird and the Bandersnatch. To discover these images in nature, an outdoor exploration follows. Children are told to use their imagination. See the thing as it is and pretend what it could be. The imagination walk is directed around the images found in the poem or the story. On one such walk, the children decided that a stand or catbrier was the tulgey wood and they would soon come upon the Jabberwock. The image, they decided, was a large fallen tree with its root system exposed. The trunk was the body and the roots were the large open jaws with long jagged teeth. At such appropriate places the children might like to dramatize portions of the narrative or even the entire story. They will begin to explore and create their own stories branching off the original plot. Stories or poems chosen do not always have to be about nature. Nature occurs in all literature. The basic concepts are universal; food chain, behavior, adaptation, protective coloration, etc. Direct the exploration around the images that demonstrate the concept you wish to emphasize.

These activities with variation have been offered for the past 10 years at New Jersey Audubon's Summer Day Camp. Parents' response is consistent. Their children are more observant and more verbal. The experience carries through the year and requires frequent visits to favorite places.

CANOE TRIPS NEAR WASHINGTON D.C.
EXPOSE PUBLIC TO CRITICAL ENVIRONMENTAL ISSUES

Martin Ogle (Chief Naturalist) and Sarah Phillips (Naturalist)
Potomac Overlook Regional Park
Arlington, Virginia

From April through November, the Northern Virginia Regional Park Authority (NVRPA) naturalists conduct half-day public canoe trips to tidal freshwater marshes of Pohick Bay near Washington D.C. Two local and timely environmental topics, the bald eagle and the Chesapeake Bay, serve as themes for these weekend events. The trips are an effective medium of environmental education, as well as an enjoyable experience for hundreds of people each year. This paper discusses four aspects of the Pohick Bay canoe trip program: 1) philosophy behind the program; 2) description of the setting and trip; 3) program themes; and 4) applicability to other programs.

Philosophy Behind the Program

It is our opinion that many (if not most) Americans are not aware of environmental problems in a realistic way. That is, they do not see or understand the actual on-site effects which people have on the environment, even if they have read or heard about them. This "insulation" is allowing continued degradation of our environment to go unrecognized. Therefore, the canoe trip is used not simply as an outdoor classroom, but to provide a purposeful, first-hand exposure to environmental problems. In particular, the predicaments of the bald eagle and the Chesapeake Bay (to be described later) are easily observed and studied in Pohick Bay.

We also believe that most environmental problems are the direct result of the activities and demands of people. Our society's excessive and wasteful use of resources is the root cause of pollution and habitat destruction. Therefore, the canoe trip is offered as an introduction to a less resource-intensive lifestyle (at least in terms of use of leisure time). The goal of the program is to have participants thoroughly enjoy themselves while learning about the environment. In this way, they may be inspired to devote more time (or to take up for the first time) activities such as bird watching, hiking, and nature study.

Description of the Setting and Trip

Setting

Pohick Bay Regional Park is one of 14 public parks of the NVRPA. It is located on the northern edge of Mason Neck Peninsula which juts into the Potomac River 15-20 miles south of Washington D.C. (Fig. 1). Pohick Bay is also within two miles of Mason Neck National Wildlife Refuge; the only such refuge designated for protection of the bald eagle. Pohick Bay itself joins with Accotink Bay to form Gunston Cove which enters the Potomac.

Being near the head of the Potomac estuary, Pohick Bay has fresh waters and a relatively high tide (2 - 2 1/2 ft.). It is a shallow body of water, ranging from just a few inches to about five feet deep at low tide. Pohick Creek, which feeds the Bay, is relatively undisturbed for much of its lower portion, but the Lower Potomac Waste-water Treatment Plant is located two miles upstream from the mouth of the creek. The plant has tertiary treatment, but handles approximately 34 million gallons per day (County of Fairfax 1985) and is a source of excess nitrogen and phosphorus (Kelso et al, 1985).

Pohick Bay is home to a large variety of animals and plants. Eagles, herons, and other water birds fish the Bay and thousands of ducks find haven there during the winter. Deer, muskrat and beaver are sometimes observed during canoe trips and their sign is abundant.

Trip

Canoe trips are advertised in local newspapers and are open to anyone 16 years of age or older. Reservations for the 17 spots on each trip are made by phone. When the registration fee is received, a letter of confirmation with directions and other pertinent information is sent to each participant. The fee covers all equipment and the services of the naturalist.

Throughout the trip. A number of planned stops are used to convey important information and to help keep the group together. Unplanned stops also occur in response to questions or when something of interest is discovered. Throughout the trip, the bald eagle and Chesapeake Bay are highlighted and discussion on these topics is often generated during the lunch break. Participants are then advised of follow-up programs, conferences, and literature available through NVRPA.

The Program Themes

The Bald Eagle

Our National Symbol, the bald eagle, is a large raptor which eats mainly fish but also small mammals, turtles, and carrion. The characteristic white head and tail feathers are not gained until the bird is four or five years of age, and juveniles may often go unrecognized in their brown and white spotty plumage.

During the 1940's - 1970's, eagle populations in the lower 48 states declined drastically mostly due to the use of the insecticide DDT. DDT was concentrated through the food chain and caused eggshell thinning and other effects which severely depressed reproduction. The number of nesting pairs in the Chesapeake Bay area dropped from about 600 in 1936 to less than 90 in 1970 (Cline 1985). DDT was banned in 1972 and bald eagle populations have increased somewhat. In 1985 there were at least 130 breeding pairs in the Chesapeake Bay area (Cline 1985b). Habitat destruction prevents populations from recovering to pre-1940's levels.

Mason Neck National Wildlife Refuge and undisturbed areas near it still provide sufficient habitat for bald eagles to live and reproduce. The refuge is closed during January through April to minimize disturbances to nesting eagles. The eagles seen during Pohick Bay canoe trips are probably mostly Mason Neck residents, although some may use Pohick Bay more exclusively during the winter months.

Chesapeake Bay

The Chesapeake Bay, with its 4600 miles of shoreline, is the largest estuary in the contiguous U.S. (EPA 1982). The Bay is surrounded by Maryland and Virginia, but four other states and Washington D.C. contribute to its 64,000 square mile watershed. The Chesapeake and its tributaries are unparalleled in natural beauty and productivity, but are deteriorating due to mans' activities. A 5-year, $27 million study by the EPA identified two major causes of the Bay's decline: excess nutrients (nitrogen and phosphorus) and excess sediments - both from urban and rural sources (EPA 1982). This accelerated eutrophication, along with shoreline development are threatening the health of the Bay. Another finding of the EPA study was that the Bay does not flush itself out as was previously thought. Due to a 2-way flow created by opposing salt- and freshwater currents, 99% of the particulates that enter the Bay stay there.

In Pohick Bay it is possible to enjoy and study a relatively undisturbed marsh area and to see the effects of man-accelerated eutrophication. Algal blooms and a limited diversity of fish are evident.

Applicability to Other Programs

Although the Pohick Bay canoe trip program presents no startling new innovations in environmental education, some of the ideas and emphases may be of value for other canoe trips and environmental programs nationwide.

One important aspect of the Pohick canoe trip is the use of local, pertinent environmental issues to add vitality and meaning to the day's activities. Unlike abstract topics, such as "ecology" or "conservation ethics", the bald eagle and Chesapeake Bay serve to focus participants' attention on real-life problems and to encourage further thought.

We also recommend that all environmental educators (in both indoor and outdoor settings) purposely design their activities such that participants will want to pursue the activities further on their own. If the exploration of natural sciences becomes a desirable experience, more people will become environmentally conscious and a low resource-intensive lifestyle will be promoted.

Another important aspect of the trip is the diversity of settings encountered and teaching methods employed. The trip progresses from open water, to marsh, to creek, and eventually to forest. This helps maintain interest levels and gives participants a first-hand look at the interrelationships of these ecosystems. Various teaching methods are used on the trip to avoid the monotony of "lecturing". Planned and unplanned stops, questions and answers, and "show and tell" items all help maintain interest. In addition, participants are encouraged to learn and discover on their own.

Finally, we recommend that follow-up activities be provided to encourage continued interest and awareness. The NVRPA naturalist staff has developed a 2-day conference, and various programs and displays on the Chesapeake Bay, Potomac River, and the bald eagle. In addition, literature on these topics is provided or recommended, and participants are given the names of other organizations to contact for further information.

In conclusion, the Pohick Bay canoe trip program offers an enjoyable and educational experience for a variety of people living in or near Washington D.C. These people represent a very inportant audience as they are a part of the most important decision-making city in our country. The authors would appreciate any comments or suggestions on how to further improve this program.

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EARTH AS HOME: AN AUDIOVISUAL PRESENTATION

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How does one facilitate increased public understanding of issues that confront environmental educators especially to general audiences in the at-large public who do not enroll in Environmental Studies courses and who are often unwilling or unprepared to be "lectured to"? Concern about the major ecological issues of the day and more than mere lip-service commitment to the environmental cause is built upon heightened awareness and appreciation of the dimensions and limits of nature. Short of such awareness and appreciation there can be no substantial concern about environmental problems or commitment to participate in bringing about constructive change. People who fail to appreciate the beauty and functionality of trees in the web of life are not apt to be very concerned about the contemporary rampant felling of forests.

One of my environmental education strategies is to try to instill in others a "genreal feeling" in regards to their place in nature's tapestry. I attempt to do this by my own audiovisual productions which employ two or more slide projectors, a programmer with lap-dissolve capabilities, and 35 mm slides which I have taken. The automated slideshow is accompanied by music and/or narration. Through music and imagery I attempt to create awareness and convey messages about the natural environment by appealing to the audience more by emotional than cerebral channels. Heightened awareness, stimulated by such AV productions, hopefully will help to counteract complacency and promote greater concern about a natural Earth environment that many people spend too little time thinking about and generally take for granted.

"Earth as Home" is a 34 minute production that focuses on several themes, including Iowa spring wildflowers, the beauty of deserts, patterns in nature, and endangered species. The accompanying narration is from part of the 1853 speech by Chief Sealth (Seattle), with music by Vivaldi, Vangelis, J.S. Bach and John Denver. In addition to college audiences, these and other of my productions are shown to secondary schools, church groups, and social and civic organizations. Through music and imagery "Earth as Home" attempts to create a mood, a feeling, about the beauty and services nature provides us free-of-charge, and hopefully encourages audience members to thoughtfully contemplate their relationships and responsibilities to planet Earth; our home!

NEW ENGLAND ENVIRONMENTAL NETWORK

Nancy W. Anderson
New England Environmental Network
Medford, MA

Established in 1977 with funding from the U.S. Department of Education, the New England Environmental Network has been extremely successful in presenting continuing education programs for teachers, governmental officials, citizens groups and environmental organization leaders.

EARTH EDUCATION: CREATING A SENSE OF WONDER

Bill Weiler
Institute for Earth Education
Gresham, OR

The Institute for Earth Education is presently working on a range of programs which will help people of various ages understand and feel the ecological workings of this world, grasp what that means for individual human actions, and undertake to live more harmoniously with the systems which support all the earth's passengers.

A YOUNG PEOPLE'S ECOLOGY ACTIVITY MOVEMENT - AN ALTERNATIVE SCOUT MOVEMENT

Bob Luitweiler
Earth Kin
Ferndale, WA

Tapping our young people's enthusiasm for living things, joy in developing hands-on projects, fulfillment in group self-directed projects, need for constructive out-of-school activities, the Earth Kin proposes developing life-long, experience-based precepts in: 1. the preciousness of all life; 2. our ability to take effective environmental action; 3. the enrichment of diverse cultures; 4. our ability to work for a world free of war. "We are kin to the Earth and to all life on the Earth."

DREY LAND ECOLOGY STUDY

David Koenigs
John Burroughs School
St. Louis, MO

The Drey Land program is an intensive outdoor program primarily concerned with the development of positive environmental attitudes and ethics through a study of ecology in a wilderness setting.

INTERACTIVE VIDEO: TRAINING WASTE WATER MANAGERS

Lynn Hodges
Tennessee Valley Authority, Knoxville

This presentation will highlight the Tennessee Valley Authority's (TVA) training program for waste water plant operators. The program is computer operated and uses video to allow self instruction. The demonstration will feature the interactive program. It will illustrate how waste water operators are trained and show the various video components used for instruction. Use of this technology is allowing training in small, remote facilities for operators of water treatment plants.

ENHANCING PRODUCTIVITY IN THE INFORMATION AGE: THE MERGER OF SCIENCE AND THE HUMANITIES

Jay Liebovitz
Insight Out Productions
Mill Valley, CA

Once upon a time people lived. Later, myth provided comfort about peoples' relationships to the Universe. "Science" sought to provide more "rational" answers by dividing things into their structural components. The deeper we look, past quarks and gluons, the more we re-discover "process," "energy," and "interrelationships" as being as important as the "pieces." "Productivity" has recently been judged by how "organized" we appear, or if our time, money, stress, relationships, etc., seemed "managed." It's time to take a quantum leap into the Information Age and balance product with process, by incorporating the scientifically proven tools of "Peak Performance". "Optimal Learning," and "Activities Management" to produce greater results in our personal and professional lives.

Citizen Action

ENVIRONMENTAL ACTION: EDUCATION AND CITIZEN RESPONSIBILITY

Richard A. Cellarius
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The Evergreen State College Faculty

Protection of the environment is a political as well as personal process. Most environmental studies curricula, however, do not include discussion of modern environmental politics as practiced by the traditional environmental organizations. They also do not see these organizations as potential employers of their graduates. Finally, environmental educators are not normally themselves participants in these organizations. This paper describes the history and nature of these organizations, discusses what environmental involvement is, and presents some suggested topics and tools for educating students in the public process of environmental protection.

The American environment is just one of many populist social, primarily middle class movements in the US. It arose in the late 19th century out of an interest in the study and aesthetic/inspirational aspects of nature. A major component during the 1920s was protection of wildlife, spurred by sportsmen's organizations that were concerned about the depletion of game. During the late 1950s and 1960s, a strong grassroots lobbying aspect evolved. For a history of the movement, see Fox, John Muir and His Legacy: The American Environmental Movement. Environmentalism today has many facets, from parks and wilderness appreciation to concern over toxic hazards, public health, and nuclear winter. Environmental activism involved educating the public on the issues, speaking out at meetings and hearings, lobbying elected and appointed officials and bureaucrats, and taking legal action. It generally operates within the bounds of the standard American socio-political paradigm. There are components, however, that are radical and revolutionary, both in tactics and in philosophy. For an analysis of the contemporary scene, see Devall, Humboldt J. of Social Relations, 6:2 sp/sm 1979, and Devall, J. Natural Resources , 20:2, April 1980.

Environmental involvement includes personal actions, such as voting, participation in the political process (precinct caucuses, etc.) as a visible environmentalist, and writing letters and testifying at hearings on environmental issues. It also includes participation in environmental organizations, not only through membership, but also by active involvement in policy development, policy implementation, and organizational management. Such participation provides environmental educators with practical experience in contemporary environmental issues and familiarity with the organizations that can be used effectively in the classroom. It contributes important professional expertise to the organizations themselves. Finally, it serves as an important model of citizen involvement to colleagues and students.

There is also a professional aspect of environmentalism that is important to convey to students. Employment possibilities include the professional staffs of environmental organizations, governmental agencies--Federal, state, and local--environmental consulting firms, and businesses that deal with or are impacted by resource management issues. Environmental law, politics, journalism, and education itself all need trained and committed environmental professionals.

Education in environmental action should include the basic history outlined above the readings in the classic environmental literature (Thoreau, Muir, Leopold, Carson, Ehrlich, The Limits to Growth, etc.) as well as more contemporary writings. Exposure to contemporary issues can be achieved through the publications of environmental organizations, current events assignments in the various news media, and attendance at meetings and programs of local environmental organizations. All make effective student assignments. The political process is described well in Alderson and Sentman, How You Can Influence Congress and Redman, The Dance of Legislation. Direct exposure can be gained through attendance at hearings and meetings of local legislative bodies, including city councils, planning commissions, etc. Many colleges have programs that will permit students to obtain academic credit through an internship with a local or national environmental organization or agency. Such an internship need not involve direct political action; many organizations and agencies welcome students who are willing to research the background and technical aspects of an issue. Finally, there should be a strong component of the "natural experience," direct exposure to the strengthening of environmental commitment that comes from individual observation and experiencing of the natural environment.

THE STRUCTURE AND VALUE CONTENT OF GROUP BELIEFS ASSOCIATED WITH EXPRESSED ACTION BEHAVIOR

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Much of the way an individual perceives and then reacts to the environment is a function of the beliefs and values that an individual holds. In a recent study (Wilson, et al., 1986), a strong relationship was established between the beliefs an individual or group holds and their perceived environmental action behavior level. Groups with expressed high environmental action behavior have more beliefs and different types of beliefs than groups with low amount of this behavior. Unfortunately, the examination of this relationship stopped short of trying to analyze the hierarchical structure and value content of environmental beliefs. With better understandings of the relationship between beliefs-values-behavior, practitioners could develop programs designed to get individuals and groups to take environmental action to resolve an issue.

The purpose of this study was to follow-up an earlier study (Wilson, et al., 1986) and examine the belief structure and value content of groups with expressed high and low environmental behavior. In the original study, two environmentally active groups were selected to participate. One group functioned as a national organization and the other worked at the state level. One-half of the membership of each organization, N=210, was randomly selected and mailed a questionnaire.

Each questionnaire contained two instruments plus demographic questions. The Free Response Belief Inventory for Environmental Action (FRBI) was developed by the research team using Fishbein's (1969) belief categories. This instrument was followed by the Behavior Inventory for Environmental Action: A One-year History (BIEA) (Hungerford, et al.1, 1982). As completed questionnaires were returned, the BIEA was scored. The BIEA scores were used to separate participants into arbitrary high and low behavior groups. Individuals whose BIEA scores did not fall within the arbitrary limits chosen to delimit high and low behavior were not used for further analysis. For the individuals in either high and low behavior groups, tallies were made of the beliefs expressed on the FRBI. The five most frequently expressed beliefs for each category were selected and placed into summaries of beliefs for the high and low behavior groups (see Tables 1 and 2).

These summaries were then sent to a panel of three judges. Panelists were asked to rank each belief according to its similarity of structure with belief stems designated by Fishbein (1969). Fishbein has grouped beliefs into six distinct belief categories (see Figure 1). These groupings range in structure from simple characteristics to complex associations. Upon completion, judges were then asked to evaluate the value content of each belief using a list of environmental values adapted from Miller (1982) (see Figure 2).

Figure 1
Categories of Beliefs
Established by Fishbein (1969)

Belief Category	Type of Belief
1	Beliefs about the component parts of objects.
2	Beliefs about the characteristic, qualities, or attributes of objects
3	Beliefs about object's relationship with other objects or concepts.
4	Beliefs about whether the object will lead to or block the attainment of various goals or valued states.
5	Beliefs about what should be done with respect to the object.
6	Beliefs about what an object should or or should not be allowed to do.

Figure 2
Environmental Content Categories
Reflecting Particular Values#

Aesthetic
Arcadian
Conservational
Ecological
Economic
Educational
Equity
Harvesting
Health
Moral/Ethical
Mystical
Personal Self-Interest
Political
Religious
Security
Social/Cultural
Time
Value Group Undetermined

- Adapted from Miller (1982)

The results indicated that subtle differences exist in the structure and value content of the beliefs expressed by the high and low environmental behavior groups. While both groups' tended to have large concentrations of beliefs at the attribute structural level, the beliefs expressed by the high behavior group received a more diverse placement in these categories (see Table 1). More beliefs from this group were placed in higher structural categories. The low environmental behavior group's beliefs seemed to cluster around the characteristic and attribute categories (see Table 2).

Comparisons based on the environmental value content showed slightly different value orientations existed between the high and low behavior groups' beliefs (see Table 1 and 2). Of the beliefs expressed by the high behavior group, there was a predominance of Social/Cultural and Educational value content found. This was in contrast to the low behavior group's content which focused on Equity and Economics. In addition, judges said it was more difficult to determine the true nature of the value content for low behavior group. More belief statements were classified as Value Group Undeterminable in this group than the high behavior group.

It appears that differences which exist between the beliefs expressed by high and low environmental action groups extend beyond the obvious differing lists of beliefs. These differences extend to the structural make up and value orientation of these beliefs. While the differences in structure are small, its combination with the value content of the beliefs could have a far more reaching affect. By being more aware of these differences, environmental practitioners could compensate for them when designing action strategies.

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Table 1
Modal Salient Beliefs Generated by the High Behavior Group #
With their Associated Belief and Content Categorizations
N=33

Modal Salient Belief	Fishbein's Belief Category	Content Category
Persuasion ...		
*1. ... is effective.	2	Value Group
*2. ... must be based on facts.	5	Educational
3. ... can be a slow process.	2	Time
4. ... should be a rational presentation of ideas.	5	Educational
5. ... can be temporary.	2	Time
Consumerism ...		
*1. ... involves boycotting.	1	Economic
2. ... needs publicity to make it effective.	3	Equity
3. ... is very difficult.	2	Social/Cultural
4. ... is very effective.	2	Social/Cultural
5. ... involves getting products developed.	1	Economic
Political Action ...		
*1. ... is effective.	2	Social/Cultural
2. ... involves supporting specific candidates.	1	Political
3. ... involves coalition building.	1	Political
4. ... needs large amounts of money.	3	Economic
5. ... involves monitoring politicians' voting.	4	Political
Legal Action ...		
*1. ... is effective.	2	Value Group
*2. ... takes time.	2	Time
*3. ... should only be used as a last resort.	6	Security
*4. ... involves filing suits and injunctions.	1	Social/Cultural
5. ... involves reporting violations to authorities.	2	Ecological
Ecomanagement ...		
1. ... allows anyone to get involved.	3	Social/Cultural
2. ... is a management tool.	1	Educational
3. ... improves the environment.	4	Arcadoam
*4. ... is effective.	2	Social/Cultural
5. ... can range from simple to complex.	2	Value Group
Civil Disobedience ...		
*1. ... gets publicity.	2	Equity
2. ... is an act of last resort.	3	Security
3. ... creates a bad image for environmentalists.	3	Social/Cultural
4. ... is unacceptable for the majority of the people.	3	Social/Cultural
5. ... is a negative response.	3	Security

Table 2

Modal Salient Beliefs Generated by the Low Behavior Group
With Their Associated Belief and Content Categorizations
N=29

Modal Salient Belief Statements	Fishbein's Belief Category	Content Category
Persuasian ...		
*1. ... must be based on facts.	1	Educational
2. ... can be useful.	2	Value Group
3. ... educated people.	2	Educational
*4. ... is effective.	2	Value Group
5. ... gets people to look at others' views.	3	Equity
Consumerism ...		
1. ... hits companies where it hurts.	4	Economic
*2. ... involves boycotting.	1	Economic
3. ... is effective only in large groups.	3	Social/Cultural
4. ... is ineffective.	2	Value Group
5. ... involves stopping the use of unsafe products.	2	Security
Political Action ...		
1. ... involves passing and changing laws.	1	Political
*2. ... is effective.	2	Value Group
3. ... involves participation in political parties.	1	Political
4. ... gets people in office who care about the environment.	5	Aesthetic
5. ... involves lobbying.	1	Political
Legal Action ...		
*1. ... is expensive.	1	Economic
*2. ... is a slow process.	2	Time
*3. ... is an act of last resort.	3	Security
*4. ... involves suits by groups.	3	Social/Cultural
5. ... makes enemies.	3	Security
Ecomanagement ...		
1. ... is direct action by individuals.	3	Personal Self Int
*2. ... is effective.	2	Value Group
3. ... is costly.	2	Economic
4. ... helps wildlife.	3	Arcadian
5. ... gets attention.	3	Equity
Civil Disobedience ...		
*1. ... gets media attention.	3	Equity
2. ... destroys property.	3	Economic
3. ... involves disobeying laws.	1	Social/Cultural
4. ... makes people aware.	3	Equity
5. ... gets attention which is usually negative.	4	Equity

- Modal Salient Beliefs are presented in rank order of occurence from highest to lowest.

* - A beliefs statement held in common between the high and low groups.

ENVIRONMENTALISM AND ORGANIZATIONAL RESPONSE: CONTEMPORARY CASES OF COLLECTIVE BEHAVIOR

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This study applies Olson's (1982) theory of collective action to environmental groups pressuring governmental and corporate bodies. Olson has explained the power of even very small groups to affect organizational policy. In fact, according to Olson, small interest groups can be more effective than larger and more established groups.

Too often in the past, corporate management has been inclined to ignore the potential impact of small collectivities (March, 1970) -- thus subscribing to the "snail-darter fallacy." This paper looks for critical ways in which businesses and even the smallest of groups can listen to each other and share responsibility for decisions that affect the environment. The study also contributes to the professionalism of public relations practitioners by suggesting ways in which they function more as managers than technicians.

Prescriptive principles for management come from the focused area of public relations rather than the broader concern of management per se or the trendier "strategic management" concept. This is an important distinction, since the most valuable application for leaders of both activist groups and organizations is not in knowing that communication between the two is important but in knowing how, when and what to communicate.

The major theoretical framework here is the four models of public relations delineated by J.E. Grunig (1984): press agentry/publicity, public information, two-way asymmetrical and two-way symmetrical. The environmental group's intent is to improve the functioning of the organization from outside. Using one of the four models of public relations, public relations practitioners work to improve the functioning of their organization from within.

When public relations practitioners, as "sensing devices," engage in issues management, they expand their role beyond publicity or press agentry to (1) identify and analyze emerging issues and (2) evaluate alternative organizational responses. Rather than trying to manage the issue or the activists, they end up helping manage the organization's efforts to contend with the problem. In so doing, the public relations manager becomes part of the reconciliation process as well as the accompanying communication effort.

Publics, especially activist groups operating outside the organization, increasingly try to control it, according to Mintzberg (1983). He described three categories of powerful external publics: the mass media, government and special interest groups. Media coverage conveys legitimacy (Larson, Zimmerman & Scherer, 1982). Agenda-setting theory holds that the media also confer status on the individuals involved in activism (Olien, Donohue & Tichenor, 1984) Harris (1982) found that groups also use the media to build a favorable image, to educate the public, or to use the ensuing public opinion as a court of appeal.

Often the pressure group tries to enlist the support of a governmental body in its crusade against an offending organization. At that point, the organization faces opposition from more than a single source and -- with governmental intervention -- real threats to its autonomy.

But how legitimate is this claim of environmentalists to control organizations they neither own, work for, supply nor perhaps even patronize? Mintzberg (1983, pp. 528-29) laid out a "conceptual horseshoe" that displays the range of possible answers. From left to right, the positions become more conservative although the continuum doubles back on itself so that the extreme views are closest together. The four positions on the left side of the horseshoe favor social goals; the three on the right emphasize economic goals. "Trust it," in the middle, seeks balance between the two philosophies. Activists adopting a left-hand stance advocate pressure campaigns, formal (legal) constraints or participation in the organization's inner workings through membership on its board of directors. Activists favoring the right-hand side trust that social norms or economic forces will keep the organization in check.

Mintzberg (1983, p.535) answered the question of who should control the corporation by referring, once again, to the horseshoe. Proponents of left-hand positions would argue for the government, employee or external interest groups represented in decision-making, government together with management, or special interest groups together with management. Proponents of right-hand positions would argue for either management or shareholders.

Public relations practitioners can play a significant part in resolving the fundamental conflicts described above. Four models of public relations practice described by J.E. Grunig (1984) provide options.

* Press agentry/publicity. Public relations practitioners who follow this model are often regarded as "flacks," mere publicists not overly concerned with the truth. Instead, they promote their organizations at all costs--rarely bothering to research the nature of their publics or the effects of their efforts.

* Public information. This model is exemplified by "journalists in residence," practitioners who emphasize press relations by churning out news releases. Their voluminous output is primarily one-way, from organization to the publics, but they value accuracy and disclosure. Like press agents, they seldom conduct research--only occasionally surveying readership or readability.

* Two-way asymmetrical. Public relations practitioners relying on this model both gather and disseminate information. Because their goal is to persuade or to control their

audiences, they acknowledge the need to know as much about those publics as possible. Then, armed with the results of opinion surveys or focus group studies, they construct messages designed to appeal to the informational needs or attitudes of those publics.

* Two-way symmetrical. This newest approach to the practice of public relations also involves both gathering and disseminating information -- but with a radically different motive than that of its asymmetrical counterpart. Instead of trying to dominate their environment, practitioners of this model want to understand and to cooperate with their relevant external publics. Research is conducted more on level of information than on attitudes. Managers recognize that the organization may need to change as much as its publics in response to the intelligence gathered.

Methodology of this study is a series of 16 within-case analyses conducted simultaneously; when completed, the within-case analyses are used as inputs into cross-case analysis.

Cases were analyzed from both the perspective of the issue group and from the organization it pressured. Information was gathered from primary and secondary sources. These sources included interviews with leaders of the activist groups; the top public relations practitioner within the target organizations; and members of the community, regional and metropolitan broadcast and print media. In addition, I analyzed organizational publications that included membership lists, intra-office memoranda, newsletters, statements of policy, brochures and letters. Finally, I examined news coverage of each issue.

Instances of activism came from both the east and the west coast. Environmental groups opposed business practices on a number of fronts (real estate development, public transportation, logging, mining, nuclear waste, bottling, etc.).

Findings led to the following conclusions.

Activism represents a major problem for organizations. Hostilities between organization and environmental groups are commonplace. They may lead to a marshalling of public opinion against the organization that may, in turn, result in governmental regulation.

Both sides involved in the typical controversy feared that the other had the advantage in news coverage; both claimed bias on the part of the media. Activists considered the press favorably disposed toward the organizations that often happen to be advertisers. Organizations thought that the media favor the underdog, represented in small environmental groups, and that activists often stage dramatic pseudoevents for the sole purpose of media exposure. Although this study uncovered few instances of violent or even dramatic protest, it did expose a pattern of activist appeal to both the media and the government.

Issues tended to be discrete; none had escalated beyond the initial concern. Tactics ranged along a continuum from polite letters to protest rallies to death threats. Groups were as small as a handful of homeowners in Washington's Evergreen Islands or as large as Greenpeace.

More of the cases studies were enduring than short-term. One of the longest-lasting controversies raged on Washington's Long Beach Peninsula, where the Willapa-Grays Harbor Oyster Growers Assn. fought a California-based developer for seven years.

No case represented a clear victory for the organization. The compromises were "as good as it got." In all other situations (and even in some settlements) the organization suffered. For example, a moratorium on building a sewage treatment plant on Washington's Port Ludlow Bay led to the layoffs of 115 employees and higher interest rates at the time of the actual construction. A resort in the Northwest was forced to spend $300,000 to improve its sewage system. A proposed basalt-mining operation never got off the ground after its small-town neighbors complained. The costs of governmental regulation and negative public opinion were often concomitant but harder to measure.

Small and medium-sized organizations often did a better job of communicating with activists than did the largest organizations. Small organizations, whose very existence could be threatened by protestors, tended to hire the help they knew they needed. Because they had few employees, and fewer still with expertise in public relation, they were quick to pay for professional assistance in the form of public relations or legal counsel. Organizations of moderate size, those with a correspondingly medium-sized public relations department, relied on their own staffs to develop a plan for dealing with the activists. Large organizations commonly continued their established programs in public relations, rarely re-designing communication strategies as a result of outside pressure.

Instead, they tended to brush aside the concerns of environmental groups--especially if the group was small and relatively unknown.

Predictions about the stance of activists and organizations on Mintzberg's conceptual horseshoe were supported to a degree. Activists typically embraced the left-hand positions of "pressure it" and "regulate it"; only occasionally were they willing to "trust it." None, however, espoused the extreme ideologies or nationalization or democratization.

Organizations, as expected, favored the right-hand stances on the horseshoe--especially "ignore it." They wanted to be left alone, claiming that economic incentives would dictate their social responsibility. More than half of all organizations studied, though, felt deserving of the public's trust. One encouraging finding is that neither activists nor organizations typically espouse an extreme--or an extremely opposed--ideololgy. In other words, they might not be so far apart as they think. And their positions are rarely as radical as each might assume.

More than a few organizations tried to ignore all evidence of pressure from outside publics. Managers of public relations explained their inaction in a variety of ways: too little money, the threat was not great enough to bother about, they did not want to legitimize the activists' complaint, their efforts were spread too thin by facing many different pressure groups, they could rely on their association to handle the problem, or the media were prejudiced anyway.

As foreseen, all of J. Grunig's models of public relations were found among the organizations studied. Most organizations practiced either two-way asymmetrical public relations or one of the one-way models--either press agentry or public information.

Many interviewees described their involvement in issues management. These practitioners were more likely to practice two-way asymmetrical public relations than were the communication technicians who responded to the study.

The final assumption held that two-way symmetrical public relations would be the least practiced yet most effective organizational response to activist pressure. However, too little evidence of balanced communication emerged to support or to invalidate this claim.

This study lends the strongest endorsement to date for the need for two-way symmetrical communication between organizations and active environmental groups. Support comes not from success stories, but from glaring lack of success on the part of all 16 cases explored. Even if the two-way balanced model of public relations turns out to be no panacea, it should help to balance the demands of all the organization's constituencies--even the smallest (but not necessarily the least powerful).

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WHAT DO WE KNOW ABOUT THE PEOPLE WHO PARTICIPATE IN NATIONAL FOREST PLANNING?

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The participation of citizens in the planning and management of publicly-held natural resources is an important topic in a democratic society. However, there is no one view about what the relationship should be between citizens and their government. The most expansive theory views participation as an end and stresses the education and development of individual citizens, whereas the most restrictive view sees citizens as relatively passive and participating largely through the electoral process.

Today, there is a clear legislative mandate for public natural resource agencies to encourage public participation in planning and decision-making. The National Environmental Policy Act of 1969 (PL 91-190), the Forest and Rangeland Renewable Resources Planning Act of 1974 (PL 93-378), and its amendments found in the National Forest Management Act of 1976 (PL 94-588), and the Federal Land Policy and Management Act of 1976 (PL 94-579) all require public participation beyond the electoral process. Yet, little empirical data are available about what kinds of people are participating; why they get involved; and what methods of participation they prefer.

Methods

The USDA Forest Service was the federal agency chosen as the focus of this study. Public participation in this study refers to those activities of individuals or organizations outside of the agency which are aimed at influencing Forest Service decision-making. A detailed mail questionnaire following Dillman's (1978) Total Design Method was used to obtain data. Four national forests in the Pacific Northwest were selected to study: Mt. Baker-Snoqualmie National Forest, Idaho Panhandle National Forests, Clearwater National Forest, and Nezperce National Forest. These forests are believed to be representative of the Pacific Northwest's rural and urban areas.

The public participation mailing list representing those members of the public who had expressed an interest in being informed of forest activities was provided by each forest. A random sample of individuals and organizations from the four mailing lists was selected and sent a questionnaire in October 1983.

Results and Discussion

A total of 1396 questionnaires were mailed. After eliminating those which were undeliverable or returned uncompleted because of illness, death, ineligibility, or other reasons, there were 1255 eligible respondents. The results reported here are from 984 usable questionnaires which were returned (a response rate of 78 percent).

Who is Participating in Forest Planning?

The following sociodemographic characteristics of participants were examined in this study: sex, income, race, political party affiliation, political beliefs, age, education, and length of residence. The results are summarized in Table 1. These results provide some support for the elitist notion of participation in that the participants are well educated and a large percentage of them have relatively high family incomes. In a recent USDA-sponsored survey on environmental concerns, Mohai (1984) found that, "the upper middle class link is not a link between the upper middle class and environmental concern but a link between the upper middle class and political activism." This may also be true for those interested in national forest planning.

Table 1. Sociodemographic characteristics of participants.

Sex (%)	
Male	84.8
Female	15.2
Income (%)	
$25,000 or more	65.1
Less than $25,000	34.9
Race (%)	
Caucasian	97.3
Non-Caucasian	2.7
Political Party Affiliation (%)	
Democrat	27.6
Republican	28.6
Independent	40.8
Other	3.0
Political Beliefs (%)	
Very conservative	4.0
Conservative	28.2
Moderate	45.3
Liberal	14.5
Very Liberal	3.9
None of the above	4.1
Age (mean years)	47.0
Education (mean years)	15.7
Length of Residence (mean number of years lived in area)	21.8

Fifty-seven percent of the participants represented themselves while the remaining 43 percent represented an organization. A distinction was made between "active" and "inactive" participants. Active participants were defined as those who participate in formal methods of participation offered by the Forest Service, in addition to receiving information through the mail. Inactive participants do not participate in Forest Service activities beyond the act of receiving information through the mail. Nearly four out of five participants were active (78.5%) in Forest Service formal participation methods. In total, 92 percent had participated in Forest Service sponsored activities and/or through political, legislative, and judicial processes, such as writing or calling a congressman (57%), filing an appeal (8%), or lobbying (13%).

Participants were also categorized according to their self-identified interest orientation as follows: preservation or environmental interests (27.2%); timber interests (20.5%); recreation (15.6%); and fish and wildlife interests (13.5%). The remaining 23 percent represented a variety of interests associated with the national forests such as mining, Native American interests, ranching and water.

Why Are People Participating?

The 21.5 percent of the respondents who reported that they had not participated in Forest Service activities other than receiving information through the mail were asked why they decided not to participate. The primary reason was that they "could not afford the time or effort more involvement would take."

Respondents were also asked to rate on a 5-point scale, ranging from extremely important to not important, several reasons why they were interested in participating in forest planning activities. Four reasons had a mean rating above "moderately important" (3.0): to defend an interest or activity which they feel is threatened; to encourage the conservation of one or more natural resources; to see that the economic effects of a given action are analyzed and considered; and to gain new knowledge.

How Are People Participating?

Sixteen methods of participation were offered by one or more of the four national forests in the study. Four methods were used by more than half of the respondents: presentations (62%), response forms (61%), personal letters (56%) and telephone calls (52%). These methods are primarily one-way flows of information, although some two-way communication can occur during an agency presentation or a phone call. Participation in actual planning or decision-making is extremely limited with any of these methods.

What Methods of Participation Do People Prefer?

A list of 28 public participation methods that have been used by forests and/or suggested in the public participation literature was provided in the questionnaire. Respondents were asked to select the three methods which they considered to be the most, second most and third most desirable.

The method ranked as being most desirable was: citizen representatives on Forest Service policy-making bodies. Although such policy-making bodies can vary in size, composition and function, such bodies may be the official decision-making process. The next four most desirable methods were: formal public hearings, surveys of citizens' attitudes and opinions, open public meetings, and meetings held for residents of a specific community. None of these top five preferred methods had been offered by any of the forests in the study according to the forests' public information officers.

Respondents were also asked to rate each of the 28 public participation methods on a 5-point Likert-type contimuum: very desirable (5.), desirable (4.0), neither desirable nor undesirable (3.0), undesirable (2.0), and very undesirable (1.0). The methods and their mean scores on the 5-point scale are listed in Table 2.

Table 2. Mean preference scores[a] for methods of public participation.

Method	Mean Score
Open public meetings	4.23
Community meetings	4.18
Surveys of citizens	4.13
Informal contacts with Forest Service officials	4.13
Direct mail of materials	4.09
Presentations	4.08
Formal public hearings	4.04
Writing letters	4.03
Show-me trips	4.02
Citizen representatives on Forest Service policy-making bodies	4.00
Workshops	3.96
Nominal group process	3.88
Liaison groups	3.87
Citizens' Advisory Committee	3.85
Open house	3.80
Direct negotiation	3.78
Telephone calls	3.77
Toll-free number	3.74
TV programs	3.73
Citizen training	3.73
Radio programs	3.58
Adult education courses	3.58
Lectures at colleges	3.48
Interactive TV	3.46
Private meetings	3.42
Computer-based techniques	3.30
Game simulations	3.08
Arbitrator or mediator	2.86

In almost all cases, those participants who had participated in a particular method rated that method as more desirable than those who had not participated in that method. It appears as though exposure to a method positively affects a person's preference for the method. Managers cannot only play a significant role as environmental educators, but should also use participant preference for methods as an important asset to stimulate better public participation.

Conclusion

This study provides empirical data verifying that specific target groups of participants in national forest planning activities can be identified and described according to their sociodemographic characteristics, reasons for participating, participation behavior, and preferred methods of participating. Such data can be used by forest managers to understand the public and to design public participation programs for specific groups.

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PRESERVATION, CONSERVATION, AND EXPLOITATION: HOW ENVIRONMENTAL DECISIONS ARE MADE IN MAINE

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It is sometimes difficult for students to understand the diversity, magnitude, and complexity of forces involved in decisions to preserve, conserve, or exploit organisms and ecosystems. To strengthen our environmental education programs we have adopted a case study approach whereby students analyze the political, economic, sociological, and ecological factors influencing current natural resource management in Maine.

Species preservation and conservation have been variously defined and are frequently used synonymously. Species exploitation, by common definition, denotes conscious, negative, and self-centered human usage of species without concern for their future status. For clarity of discussion, we use more restrictive definitions of these words as descriptors of three basic ways that humans interact with other species and ecosystems.

We define preservation as action taken to protect/maintain species (and/or ecosystems) for reasons other than consumptive use or direct economic gain. Species are preserved because it is believed they are an integral and necessary part of the biosphere and because they have an inherent right to exist. Organisms protected under the U.S. Endangered Species Act and migratory birds are examples of species society chooses to preserve.

We restrict our definiton of conservation to the management of those species harvested for direct consumptive and/or economic gain. Conservation, like preservation, results in the continuance of species into the future. Conservation management activities, however, are often directed towards producing maximum and sustained numbers of organisms of interest. As a result, ecosystems are often manipulated to favor the desired species. Familiar examples of conservation include activities directed towards producing maximun and sustained numbers of organisms of interest. As a result, ecosystems are often manipulated to favor the desired species. Familiar examples of conservation include activities directed towards the production of upland game birds, waterfowl, sportfish, deer, and some commercial marine species.

Exploitation, by our definition, occurs when economically valuable species are harvested by methods precluding long-term sustained yield. Species exploitation may be intentional (because of the "Tragedy of the Commons", sensu Hardin, effect) or unintentional (because of ignorance of the species biology and replenishment rate).

The history of human interaction with other species is filled with examples of exploitation. Prior to the introduction of "bag limits", fish and game were regularly harvested exploitatively in the U.S. The current endangered status of many fur-bearing animals and some marine mammals is the end result of exploitative harvesting. Exploitation often causes serious reduction in species population size and leads to regulations fostering subsequent preservation or conservation efforts.

In their case study approach, our students select a species (or ecosystem) occurring in Maine and analyze, among other things, the following:

I. Is the species being preserved, conserved, or exploited?

II. Preservation:

- A. What is the current status of the species?
- B. What factors have created the situation requiring active preservation efforts to save the species?
- C. What action(s) is(are) required to preserve the species?

III. Conservation:

- A. How is the species legislatively and biologically managed?
- B. What is the ecological niche of the harvested species and how does its management affect other species in the ecosystem?
- C. What are the harvest techniques used to ensure long-term sustained yields?
- D. What is the sociological and economic importance of the species being conserved for the natural resource harvesters?

IV. Exploitation:

- A. What is the evidence suggesting the species is being exploitatively harvested?

B. What forces (political, economic, biological) are causing the species to be exploitatively rather than conservatively, harvested?

C. What changes would be required to promote conservative, rather than exploitative, harvest of the species?

For a case study preservation we examine a program started on Maine's coastal islands in 1984 to re-establish breeding colonies of Common, Roseate, and Arctic Terns (Sterna hirunda, Sterna dougallii, and Sterna paradisaea, respectively). These species, in danger of extinction in Maine because of egg and chick predation by abnormally large populations of Herring Gulls (Larus argentatus) and Great Black-backed Gulls Larus marinus), have been successfully re-established in two island colonies (1500 breeding pair in 1986). Preservation of the terns, however, has required the intentional poisoning of approximately 1,000 gulls.

The Kennebunk Plains in southern Maine contains a 400-acre remnant of a once more extensive Coastal Plains Grassland ecosystem. Two state endangered species, Grasshopper Sparrows (Ammodramus savannarum) and Black Racer snakes (Coluber Constrictor Constrictor), exist within this ecosystem type. Northern Blazing Star (Liatris borealis), a plant species which is rare and declining throughout its range, and Toothed White-topped Aster (Seriocarpus asteriodes), found only at this site in Maine, are also residents of this grassland habitat. This ecosystem has survived only because it has been frequently mowed and burned for commercial blueberry production. The ecosystem and component species are currently threatened by local development and the introduction of a new herbicide which kills almost all plant species except blueberries. We use this case study as an illustration of how a threatened ecosystem must be preserved in order to preserve the threatened species it contains. Preservation of this ecosystem type, however, will require a continued human influence in the form of periodic mowing or burning.

From an economic perspective, the lobster (Homarus americanus) is the most valuable marine species in Maine. Its 90-year history of management illustrates the complexity of a system where political, economic, sociological, and biological factors influence the actions taken to conserve a species.

Lobstering, like other common marine resource properties, may become the occupation of any legal resident (i.e. unrestricted entry). Also, there are no limits on the number of traps tended, their location, and length of time they are fished. These facts, along with dramatic changes in fishing technology, have resulted in a tremendous expansion of fishing pressure. For example, comparisons of pre-World War II statistics with those since 1970 indicate that significant increases in lobstermen (3,000/yr versus 8,500/yr) and traps fished/individual (70 versus 200) has led to only marginal increases in total catch from 5,562 to 8,786 metric tons/yr.

Current regulations control minimum harvestable size and require trap escape vents for undersize individuals. In addition, 10,000 sexually mature females are permanently marked each year and must be returned to the fishery if trapped. The number of traps fished and the efficiency of placement, however, allows 85-90% of all legal lobsters to be caught. The need for more restrictive management of the fishery has recently become apparent with the finding that a majority of the lobsters caught are sexually immature. All suggestions for regulatory changes have been strongly opposed by members of the fishing industry because yields have remained stable for a twenty year period. This has, however, required at least an eight-fold increase in effort, suggesting that Maine's lobster fishery may be shifting from a period of species conservation to one of exploitation.

Soft-shell clams (*Mya arenaria*) have been harvested commercially in Maine since the early 1700's and provide another example of the interplay of social, economic, and biological factors in a species conservation program.

Maine law allows coastal communities to manage their intertidal clam populations. Of 102 municipalities with clam habitat, 47 have chosen to exercise this privilege and have adopted town-specific "shellfish conservation ordinances". Town ordinances generally restrict harvesting to residents and specify which flats will be opened to digging and for how long. Some towns do engage in re-stocking depleted areas, but this is rare.

Current state regulations require only a nominal license fee and that clams less than two inches (shell length) be returned to the fishery. This size limit, which has no effect on clam abundance, was enacted in 1984 because the average size of "steamers" had been decreasing steadily for many years. The significantly smaller size of Maine clams, compared to those being shipped from other states and Canada, caused Maine to lose its historical market dominance. The 1984 regulation has significantly affected statewide yields (down 9% from 1984 to 1985; down 33% to date in 1986 compared to the same time interval in 1985) but has increased bushel prices from summertime highs of $40.00 prior to 1984 to $80.00 this season. Social pressures allowing unrestricted numbers of resident diggers, coupled with the lack of information about the degree of harvesting a particular flat can sustain, have led to substantial decreases in catch/unit effort and an industry that is concerned about its future stability.

The Mahogany quahog (*Arctica islandica*) is a shallow burrowing bivalve forming dense beds on muddy bottom at water depths ranging from 30 to 600 feet. The development of this fishery provides an example of a case study in species exploitation.

During the 1970's, the National Marine Fisheries Service conducted studies showing that the quahog is a long-lived species with low recruitment/reduction rates. Individuals two inches in size were found to be 30 to 60 years old. A three and one-half inch individual was over 200 years old.

In 1974, several fishermen in east coastal Washington

County requested assistance from the Maine Department of Marine Resources to develop efficient quahog harvesting methods. Despite the earlier studies which raised the question of resource sustainability, the assistance was provided and a drag harvest method developed. The State imposed no limit on number of harvesters, type of gear, time when dragging could occur, or the amount of quahogs which could be harvested.

In 1980, there were about 15 quahog boats dragging 40 to 60 bushels each/day for six months in an area approximately 70 square miles. By 1986, about 60 boats were fishing the same bottom with each averaging 25 bushels per day. The fact that a four-fold increase in the number of harvesters has resulted in only a doubling in catch suggests that the resource is being rapidly depleted. In the absence of any State regulation, the exploitation of this species can be expected to continue with the resultant loss of this fishery in the near future.

THE POLITICS OF PARALYSIS: BUREAUCRATIC LANGUAGE AND INERTIA IN THE GYPSY MOTH EIS

Kenneth Nolley
Willamette University

In early 1982, the Oregon Department of Agriculture (ODA) announced its intent to attempt to eliminate a population of gypsy moths in South Salem. When I joined a group of Salem citizens determined to oppose the spraying of toxic chemicals on our neighborhoods, I was rather naive about the bureaucratic and political process we were engaging. Consequently, I was surprised and enraged when an ODA hearings officer, growing impatient with the testimony opposing chemical insecticides, remarked that if things didn't move along faster, the "little critters" would hatch before the hearing concluded, adding he knew that was what some of us in the hearing room wanted.

His ill-considered remark forced me to realize how limited our access to the decision-making process really was and helped bring me to consider how richly articulated bureaucratic agendas usually are before they become accessible to public comment. In memos, pamphlets, environmental impact statements and press releases, the bureaucracy tends to set the terms of the discussion in a language that favors their ongoing policies. Though our effort in what was to become Oregon Environmental Council vs. Kunzman (Civil No. 82-504-RE) was to oppose what we regarded as the misuse of toxic chemicals, the paralyzing affects of the language we encountered are, I think, present in most environmental disputes.

Bureaucracies, like academic disciplines (and often in conjunction with them) tend to create their own languages. These languages serve systematically to direct discussion into or away from certain areas and to create an aura of authority to be exercised only by a priesthood initiated into the mysteries of this particular liturgy. I should like here to consider three different types of verbal manipulation that occur and which, taken together, tend to undermine dissent and to produce views in harmony with agency orthodoxy.

Perhaps most basic, and therefore most visible, is word choice--the naming of objects and activities with which we are to deal. First, the gypsy moth is invariably labelled a pest, "the most notorious insect pest of hardwood trees in the Eastern United States" (McManus 1). Perhaps few who have lived with serious gypsy moth outbreaks would disagree, but we have come to use the label pest further in pesticide, a word that suggests a high degree of specificity in target organisms. But all chemical insecticides or herbicides are in fact biocides--"with some degree of selectivity to be sure, but potentially harmful to all life forms" (Morgan 4).

Further, pesticides often become merely materials in the literature on gypsy moth, materials that are seldom sprayed but more often applied (perhaps aerially) by an applicator to an infested area, as if they were a medicinal salve being rubbed into inflamed skin. The positive resonance of such language is as deep and strong as it is subtle. The positive resonance grows even stronger when authors of documents refer to "infestations of epidemic propositions" (Gypsy Moth in Oregon, 1983 1). Alternately, pesticides often become tools in the literature, tools employed in eradication or suppression projects.

The net effect of such terminology is to shift attention from the actual or potential function of a toxin--to kill something, or perhaps some things--to a metaphorical understanding of the term where its less attractive elements are concealed, rather the way that the shrink-wrap plastic and one-way mirrors of the meat counter in the supermarket conceal the fact that the steaks we purchased for dinner were once something else's body parts. In the case of toxic chemicals, such metaphoric softening conceals not the death of someone else's cow, but the risks posed to human beings and all other living creatures in the ecosphere of the designated pest.

Such concealment is the natural extension of state and federal policies in the past that pushed the use of Paris green (arsenic), lead arsenate and DDT to kill gypsy moths. Not surprisingly, then, ODA speaks wistfully of the near eradication of gypsy moth with DDT (Gypsy Moth in Oregon, 1982 1) and USDA brackets concerns over the safety of DDT by putting them in quotation marks (Gypsy Moth Supression and Eradication Projects FEIS 1985 6). Both agencies continue to avoid consideration of possible negative effects of pesticides.

A more subtle and perhaps more significant form of verbal manipulation arises from the choice of particular sentence constructions. For example, ODA and USDA prose, like most bureaucratic prose, is replete with passive voice verbs. Rather than using subject-verb-object constructions, then, the writers of agency prose often transforms their sentences into object (nominal subject)-verb constructions, where the agent of the action is deleted from the sentence entirely. In such prose, "a number of chemical insecticides are approved for use" (Gypsy Moth in Oregon, 1984 10), for example, instead of someone or something approving them. The responsible agent simply disappears, like a transcendent god, into another realm, where its reliability is no longer in question.

The collective effect of such construction is most apparent, not surprisingly, when they are most numerous. In significant numbers, passive voice constructions create a magical sense that things happen automatically; they blur responsibility ("Taxes will be raised next year," as opposed to "someone or something will raise taxes next year"). They also create a sense of omnipotence, omniscience, and security--steps will be taken, notice will be given, measures will be followed--even as they make it impossible to know just who will be responsible for any of these projected actions.

Such prose is particularly effective when these departments wish their judgements to go unchallenged. "The biological insecticide has been found to be effective in suppression efforts but not in eradication programs" (Gypsy Moth Problem 5). In memos and brochures for the public, where no documentation is provided, such assertions foster the myth of the unchallengeable expert and discourage all but those trained in research from voicing contrary opinions.

Finally, on a broader level, the language of the discussion is manipulated in larger rhetorical strategies that may create or dissolve oppositions and reinforce the selective perceptions of the word choices I discussed earlier. Both the Gypsy Moth Suppression and Eradication Projects FEIS and the ODA's Gypsy Moth in Oregon pamphlets, for example, provide a list of alternative ways of dealing with gypsy moth outbreaks. The FEIS considers: "1) no action, 2) chemical insecticide treatment, 3) biological insecticide treatment, and 4) integrated pest management (IPM). It recommends number 4.

ODA's list of four alternatives changes from year to year, but the 1982 document lists: a) chemical insecticide, b) biological insecticide, 3) IPM, and d) parasites and predators. They also favor IPM.

However, the hard questions in any gypsy moth infestation have to do with whether to use chemical insecticides or biological alternatives. Such a list implies that a chemical solution has been rejected when it clearly has not. And the combination of detection trapping and a chemical spray such as was employed in Salem in 1982 hardly counts as a meaningful alternative to a chemical spray alone for someone whose home is being blanketed with a mist that they suspect may be toxic to more than the "pest" it is supposed to eradicate.

I do not mean to suggest that the people who produce the bureaucratic prose of ODA or USDA are particularly perverse or pernicious in their verbal practice. They do what we all seek to do--construct an argument designed to persuade in all of its elements, even when it pretends only to be giving information. But environmentalists dedicated to ends other than those served by the bureaucracies must not merely counter the larger rhetorical strategies of their arguments, as we often realize we must. We need also to develop alternative terminologies which preserve a sense of the complete consequences of an environmental action and sentence structures which preserve a clear sense of act and actor, of responsibility for events commensurate with our view of responsible sterwardship of the planet.

Our success may be as dependent upon our ability to influence the glossaries and sentence structures of the debate as it is upon our ability to exert influence in political cloakrooms and courtrooms, for our ability to be convincing in the latter is directly dependent upon our taking greater control of the former.

Note: This assessment of the efficacy of DDT is rather more sanguine than the history of the period as narrated in USDA's authoritative study (Doane and McManus 3-4).

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AMERICAN ENVIRONMENTALISM: OUR ARTISTIC/LITERARY HERITAGE

Charles H. Yaple
State University at Cortland

The following narrative provides a summary of a multiple projector slide/tape presentation which traces the history of American environmentalism in terms of contributions made by literary and artistic individuals.

The two hundred and twenty-five count slide program begins with the colonialization of the "New World" by European powers in the late 1600's. The point is made that European settlers brought culturally influenced attitudes which generally caused them to view wilderness as an obstacle to civilization and human survival itself. Notions of "conservation" of natural resources were practically non-existent given the situation facing pioneers in what often was a hostile environment.

Indeed, progress was measured in the number of acres of cleared land one could bring to pass.

Despite the pressures of survival a fairly significant number of influential Americans held ambiguous attitudes towards nature. While viewing a pristine natural landscape, no less a wilderness conqueror than Daniel Boone once remarked:

> No populous city... with all the varieties of commerce and stately structures could afford so much pleasure to my mind as the beauties of nature I found here.

Other Americans, including Thomas Jefferson, verged on the edge of boasting about the beauty and uniqueness of the land.

Two cultural forces of the times, "Nationalism" and "Romanticism" fueled the ambivalence expressed by Boone and others. Struggling for acceptance in the world of nations, many American leaders in art, literature and politics found themselves expressing pride in the young country's wilderness. Taking quickly to the Romanticist's enthusiasm for the remote, solitary and mysterious, American artists and writers began to produce works proclaiming the virtue of wild land. In a relatively short span of time a number of individuals including William Cullen Bryant, James Fenimore Cooper, Ralph Waldo Emerson, Henry David Thoreau and others utilized their talent with the written word to both promote the values of nature and bemoan the rapid negative impact that advancing civilization was causing. Their efforts were supported by the artistic endeavors of wildlife painter John James Audubon and the landscape masterpieces of Thomas Cole, Asher Durand, Frederick Church, Albert Bierstadt, Thomas Moran and others.

As the young nation emerged from the Civil War other literary/artistic figures joined their predecessors in raising public consciousness about the value of nature and played important roles leading to the establishment of the National Park System. The ideas of George Catlin, George Perkins Marsh, Frederick Law Olmstead and others set the stage for rapid designation of numerous national parks in the late 1800's and early 1900's.

The dynamic personalities, and writings, of John Muir and Theodore Roosevelt were also instrumental in making preservation/conservation sympathies into law. Influenced by Muir and first Chief United States Forester, Gifford Pinchot, Roosevelt's presidency embraced the establishment of many national forests, parks and wildlife refuges. Indeed, it was during Roosevelt's administration that the very term "conservation" was coined.

A growing nature study movement, initiated by the writing and teaching of Louis Agassiz, Aldo Leopold and others began to mature into the science of ecology during the first half of the twentieth century as concepts concerning the interrelatedness of life were popularized. In a span of some thirty years Leopold laid the groundwork for turning wildlife management into a legitimate science, served prominently in several conservation organizations and helped found the Wilderness

Society.

Taking a cue from John Muir's ability to influence a President, Jay "Ding" Darling utilized his pen to coax Franklin Delano Roosevelt into supporting wildlife legislation. An editorial cartoonist and Pulitzer Prize winner, Darling used his syndicated newspaper connections to generate public support for wildlife related laws including the Duck Stamp Act of 1934. Working with the newly created American Wildlife Institute, the Izaak Walton League, the Audubon Society and others, Darling's efforts, by 1940, had helped double the acreage held by the federal wildlife refuge system.

The end of World War II and Linnie Marsh Wolfe's winning of the Pulitzer Prize, for her biography of John Muir, launched a revival of interest in conservation issues. A succession of artisis and writers including Ansel Adams, Aldo Leopold, Joseph Wood Krutch, Edwin Teale, William O. Douglas, Bernard DeVoto, Eliot Porter and many others made significant contibutions that led to the environmental decade of the 1970's. The writing of DeVoto and Krutch along with the art of Adams and Porter became regular fare for Sierra Club publications and adorned the coffee tables of many influential Americans.

Seldom does one book launch an immediate movement of world significance. Yet, that is exactly what author Rachel Carson accomplished. Published in 1962, Silent Spring became the "Uncle Tom's Cabin of modern environmentalism" by directly tying human survival to the ecological viewpoint. Within a decade millions of people would label themselves "environmentalists" and through some 3,000 organizations produce an avalance of activism, literature and legislation causing the 1970's to be called the "Era of Environmentalism." Writers such as Paul Erhlich, Barry Commoner, and Barbara Ward became famous as they documented the numerous environmental dangers facing humankind.

Much progress has been made since Carson wrote Silent Spring but many environmental dangers still exist. Every minute acres of tropical rain forest disappear, hundreds perhaps thousands of toxic waste dumps threaten the health of present and future generations and acid rain falls from our skies. Many battles to protect our natural heritage have been won but the struggle lingers on to preserve the Earth.

May the work and inspiration of the great artists and writers of the past motivate and energize those who would continue their efforts to preserve the earth and all its creatures. The audio/visual production, American Environmentalism: Our literary/Artistic Heritage is dedicated to their memory.

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GLOBAL TOMORROW COALITION/WEST

Diane Lowrie
Global Tomorrow Coalition/West
Portland, OR

Since its creation in 1985, the Western office of the Global Tomorrow Coalition has stimulated cooperation and communication between environmental educators in school and non-school settings. Perhaps best known for sponsorship of the April 1985 Globescope Conference in Portland, GTC/W has developed curriculum guides, offers in-service teacher workshops, and promotes dialog among educators, public officials, and business people in the cause of global sustainable development.

REDEFINING THE POLITICS OF OLD-GROWTH

Pam Crocker-Davis
National Audubon Society
Olympia, WA

Crocker-Davis will outline the interests and issues of the major stake-holders in the old-growth debate, and will question whether innovations in conflict resolution, such as mediation, are appropriate.

THE ELECTRONIC CITIZEN

Robert Deward, Pacific Bell
San Fransisco, CA

By using a mix of telecommunications and the personal computer, an individual or a grass roots group can increase their influence exponentially. This technology is the "little man's equalizer," a peaceful equivalent to Sam Colt's "peacemaker."

REFLECTIONS OF AN ENVIRONMENTAL EDUCATOR IN POLITICS

Gene Krupa
Legal, Alberta, Canada

Well informed, effectively gathered and presented public opinion can make the difference in government decisions! I believe very strongly that we can make truly "people powered" representation work at both the provincial (state) and national levels of government. This presentation shares my personal experience: motivations, research, organization, campaign strategy, future outlook and case studies. My aim is to inform and motivate others to become politically vocal and effective.

AN UPDATE ON CORRELATES AND PREDICTORS FOR RESPONSIBLE ENVIRONMENTAL BEHAVIOR

Thomas Marcinkowski
Southern Illinois University, Carbondale

The literature in EE (e.g., definitional and goal statements, curricular materials, research documents) evidences a consistent emphasis upon the role of citizen involvement in the remediation of environmental issues. The premise of this study is that as we come to know more about committed and involved citizens, we will be able to refine both our operational models of environmental literacy and behavior, and our curricular and instructional designs. Using the findings of previous research (Hines, 1985), the researcher sought to replicate and extend Sia's (1985) efforts in generating a model of predictors of responsible environmental behavior. Environmentally sensitive and active members of Sierra Club (N=18) and Illinois Audubon (N=13) chapters were engaged in an extensive survey and interview data collection process. Data were analyzed using frequency, causal tendency, correlational, and regression statistics. Findings and conclusions will be presented, and implications will be discussed.

EE and Communications

STALKING THE COMMUNICATIONS MEDIA

Dr. Duane R. Pierson
Director, Outdoor Education
SUNY Fredonia

Communications and education often are the same. It is the nature of the human animal that we learn by communication. As we live in a dynamic communications age, we must be learning a lot.

It is interesting that environmental educators have not been more attuned to the significance of communications and those media used for communication. Those children that we have for a short period of time, sometimes only for an hour on a nature walk, are daily subjected to hours of electronic communication messages. One recent study demonstrates that elementary age children watch, on an average, four hours of television per night. Yet, I have found that when I offer workshops on using communication tools to our advantage, most environmental educators, for some reason, stay their distance.

Environmental educators are not the only ones who compete against the communication media. Classroom teachers face the same problem. There was a day not long ago when students were happy to hear a story, have the teacher read from a book, or became thrilled at pictures of any type presented by a teacher. People used to come from miles about to hear a lecture. Children and adults spent their free time reading books. Today, all of us are bombarded throughout our days by electronic messages, visual and aural. I fear educators of all types do not fare well against this competition.

It is difficult for the best of us educators to compete with a video production that has had vast amounts of money and creative effort expended to make it successful. Children accustomed to exciting musical backgrounds, extensive visual enhancement and professional dramatic presentations, not to say expert dance choreography and comedy effects, come to expect this in all presentations. This is not to say their expectations are overt, but they are conditioned to expect a high entertainment level in those things designed to catch their attention.

I am often surprised and disappointed when children act bored with and not interested in those things which excited me as a child. I do not believe I am a poor lecturer or storyteller, yet I find my presentations less and less accepted as I would like to have them received. Then, I turn on my television and watch a music video. How can I, as a teacher, compete with this excitement and polish? I cannot if I do not use some of the same tools for my own benefit. As an educator, I have not been using the most powerful communication tools available. We have permitted these powerful tools, operated by the world's best creative people, to be used to sell cigarettes rather than the environment.

We have to not only use these tools but have students understand how they work and the effects of their usage. Often, teachers dismiss television as just some cultural phenomenon that is currently on the scene. They deem it not worthy of consideration as either a competitor or tool. But it is a very effective tool and one we are not using. We are into our second or third generation of children who have received a large share of their education via television. In certain ways they are much better educated than we were at their age and, in some ways, terribly mis-educated.

We can easily observe developing attitudes about outdoors and nature. Marlboro cigarette commercials have probably educated more people to nature than all the nature and outdoor education centers put together. Be assured that these commercials give a brief message and one for a product which annually kills millions of our fellow citizens. But, millions of Americans believe that somewhere there is an ideal natural setting. This place is broad and clean, with people on horseback, has exquisite scenery, and is untarnished except by cigarette smoke. Through television we come to know that somewhere there are beautiful beaches with no people on them except maybe one gorgeous bikini-clad girl or some beautiful young people playing volleyball. It goes on and on. Nature is used as a backdrop to sell a product, and people get a message which heightens expectations to a level that cannot be reached.

Anyone who has worked for any length of time in a park or forest gets to know these expectations. People are surprised to find other people want to camp in their area or that there are other people on the beach. Visitors who learned their nature from watching Walt Disney films about beaver ponds or Grizzly Adams movies, are surprised when there are no deer running about or friendly bears sticking their cute heads in the cabin window.

My point is that those who have control of the communication media use the elements of our field to give distorted images, but we do not use their tools to get out those messages beneficial to our purposes. They use nature with their modern tools. We use nature with what have become archaic methods.

Let me say at this point that using film or video for nature productions is not new. The choices available in any library of film and video productions are massive. Many of these are well done as to content, aesthetics and quality of production. On almost any evening one can find an excellent nature video in most viewing areas. All educators should make themselves aware of these resources and incorporate them into their presentations. A classroom teacher, no mattter how wonderfully competent, is going to be assisted in a positive manner by a production which costs thousands of dollars and took months of time by wildlife photographers, editors and writers to complete.

Now for some suggestions on how to cope with the media communication age. As an educator you do not have to go it alone, but you can stalk this animal with your students. Present it to them as a problem and work it out together.

Step number one is to overcome fear. We know people are afraid of cameras, computers, and just about anything they have to plug in. We also know that many who become the greatest advocates of these things are those who once feared them. We humans like nothing better than something we once feared and with which we are now comfortable. The only way to overcome fear of a television camera is to take one home and experiment by yourself. The basic ones are very simple to use. Almost all schools now have them available. Do not be put off by the jargon as it rapidly becomes commonplace. Just use the device by yourself or with your family until it becomes natural. Then do the same with your students. Let them discover for themselves how it all works.

Students should have explained to them how they are subjects of a media communication world. They should know that they are greatly influenced, sometimes wrongly, by thousands of messages a year. Thousands of people spend billions of dollars trying to both entertain them and effect their thinking. Perhaps the only way for them to cope with this assault is for them to fully understand the machinery.

Perhaps before actually working with media you and your students may want to study the communication media as a field and propaganda as a force. Have them learn exactly what a newspaper does from editor to advertisement salespeople through layout and reporters. The same can be done with a TV station as they learn all the jobs including salespeople, directors, camera people, etc.

Once students have an understanding as to what communication media is, you may want to use more of the following ideas in your classroom or center:

Written Media

MORNING NOTICE

Each morning place something in your school's morning notices. You can ask for your own little space in the corner and put daily spottings, happenings or expectations. This can be called Eco-notes or Nature Happenings.

ENVIRONMENTAL BULLETIN BOARD

Ask for a bulletin board in one of the school corridors to be assigned to you for an environmental or nature board. On this board you can place news clippings, photos, examples of students' work or bulletins written by your students.

NEWSLETTER

Develop an environmental or nature newsletter with a complete student staff. Students learn many skills including layout, editing, commentary, and management.

JOURNAL

Publish each year a class journal. Have each student keep a journal to include observations, thoughts, poetry, sketches, and critical writing. Select the best from each to be included in "Our Class's Year With Nature." Publish it and distribute it to parents, other teachers, administrators or various friends.

Film Media

PHOTO COLLECTION

Make a photo collection of students' photographs taken on environmental or nature subjects. These can be displayed on a bulletin board or individually as in an art gallery.

SLIDE SHOW

Prepare a slide show. These can be general or on a specific subject. Not only do they convey a message and teach photography skills, but it gives students a chance to learn to organize their communication message. These can also be set to music or narration with excellent effect.

35 MM FILM STRIP

Students can make a 35 MM film strip. This is a particularly good project when filming posters, pictures, etc. Making a film strip is a process that most audio-visual specialists can tell how to do.

FILM

It is not as difficult to make a film as many teachers suspect. All that is needed is a camera and editing machine, both owned by most schools. The camera can be 8 MM, Super 8 or 16 MM. One advantage to using film is its mobility. Students also have the benefit of learning editing techniques as film editing is much simpler than video editing.

Audio Media

RADIO SHOW

Using a simple cassette tape recorder with microphone it is easy for your class to produce a radio show. They can write a script, research information, provide background music, and do all the things done by regular radio shows. If it is well done and brief (3-5 minutes), you may be able to convince your principle to broadcast it over the school public address system.

RECORD NATURE

Your students may enjoy recording the sounds of nature. They can learn to set up a blind with equipment beside a swamp or marsh. Not only are there instructional advantages to this, but the sounds can be used as background for other projects.

Video Media

TV MAGAZINE

Students can do a magazine format show within the classroom. They may tape slides, do interviews, play music, plus give bulletins and information pieces. This can be done by setting up a regular production studio with producers, directors, writers, camera people, etc.

TALK SHOW

A very effective but easy program to produce is the talk show. It requires making a set and developing a format. The list of subjects to be interviewed by the student talk show host is endless, to include other teachers, local naturalists, or anyone with a knowledge of the environment.

CABLE TV

Most communities have a cable TV service. It is usually part of this company's contract to offer public service programming and assistance. This means that if you have a good show you have put together, or even an idea, you may be able to have it aired locally. Simply call your local cable TV service to discover what are the rules and guidelines.

Once you and your students have learned something about communication media, and have done a few productions, it will be a good idea to move on to criticism. After you know something about something, you are somewhat of an expert which gives you the right to criticize. As a practical step you can appoint some of your students critics and give them the duty of reviewing the work of their classmates. They can move on from this work to actually criticizing regualr programming. If you can give your students a critic's eye, they should ever after be less susceptible to media efforts to move and persuade them. The more critical they become, the better citizens they will be.

Now to you, as an educator, what have you learned once you have stalked the communication media, captured it and examined it? You should be free of fear of it and its powers. You should understand its strengths and its weaknesses. At your disposal you will have new and powerful teaching tools. Most importantly, you will be caught up with the learning modes of your students. You will be using your material with methods that are theirs, which they understand, and to which they relate. Finally, you will have available a method to teach hundreds and thousands of people rather than a handful.

FREQUENCY OF NEWSWEEK'S COVERAGE AS COMPARED WITH THE PUBLIC'S CONCERN REGARDING ENVIRONMENTAL POLLUTION

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S.I. Newhouse School of Public Communications
Syracuse University

Earth Day, a "pseudo-event" which took place April 22, 1970, was created to spotlight the polluted state of United States' water, air, and soil, with the hope of galvanizing the populace into seeking solutions to pollution problems.

The pseudo-event, a contrivance to make it appear that something has happened to gain publicity for some business, institution or cause (Boorstin, 1961) has become the characteristic method of gaining access to the channels of communication in the age of the mass media (Chaffee and Petrick, 1975). Lippmann (1941) is credited with introducing the concepts of "pseudo-environment" and "pseudo-fact." Pember (1977), in Mass Media in America, said that reporting of pseudo-events is not new, but added that it is not disappearing, either. The fact that pseudo-events are staged for the press makes them easy to report, and hence such "events" (e.g., demonstrations, coverage of the president, pre-election polls) frequently are reported (Pember, 1977).

Earth Day was carefully planned, staged and carried out across the country to draw attention to the pollution of the world's water, air and soil, and the need to take action to preserve these natural resources. On Arbor Day, April 22, 1970, an estimated 2,000 college campuses, 2,000 community groups and 10,000 schools simultaneously staged demonstrations to make the country and the world aware of the need to stop polluting the planet. During this coast-to-coast mass protest, car engines were buried, gas masks worn, and "America the Beauitiful" was sung. An estimated 22 United States senators and governors from Massachusetts to Oregon participated in the nationwide activities (Newsweek, 1970). All of these staged activites received ample coverage by the media.

By the second half of the 1970s there was less reporting of environmental pollution than there had been earlier in the decade. It was being said with increasing frequency that the environmental movement was dead. According to the Christian Science Monitor in June, 1978:

> After nearly a decade of rising clout in Washington, a series of recent setbacks in Congress, and even in the avowedly environmentalist Carter administration suggest the movement's influence may be slipping. Foes of the environmental movement welcome the rebuffs as a return to "common sense and the rule of

> reason," in the words of one, while its friends deplore them as "wavering" and "backsliding." But both sides tend to agree with an observation by Rep. James M. Jeffords (R) of Vermont, cochairman of the caucus of environmentally minded lawmakers known as the Environmental Study conference. "All of us recognize," he said in an interview, "that the great momentum we had in the '70s has subsided."

Did the quality of the environment reach its nadir shortly after 1970 and then begin to improve? Did federal obligations and outlays for pollution control and abatement peak in the early 1970's? Did the people's interest in the environment reach its apex in the early 1970's? Did the media's reporting of environmental issues peak in the early 1970's?

Methodology

All of these questions beg the research question this study addresses: Were the media accurate in their coverage of the environment?

Using the Kendall rank correlation coefficient, r (tau), to analyze this question, the environmental pollution content of Newsweek magazine was examined from 1969 through 1975. This weekly news magazine had at that time a circulation of more than 3 million and was the magazine with the 15th largest circulation in the United States (Selective Markets, 1976) Newsweek purports to summarize the week's news, and because of this it might be expected to provide a more balanced picture of the news than would, say, a non-news magazine or even a daily newspaper.

To determine "media accuracy," the environmental coverage in Newsweek was compared with indicators of public interest in the environment, environmental quality indices, and levels of federal obligations and outlays for environmental pollution from 1969 through 1975.

Data concerning public opinion on environmental quality (i.e. how serious was environmental pollution in the minds of the American public in a given year) were gathered from the Gallup Opinion Index. The environmental quality indices for this study are a compilation of data from the annual Environmental Quality Index which has appeared each year in National Wildlife magazine since 1969. Data on federal obligations and outlays for pollution control/abatement were collected from the Statistical Abstract of the United States.

A purposive sample, using every third issue of Newsweek, was employed. Eighteen issues per year of this magazine were analyzed each year from 1969 through 1975, yielding a sample of 126 issues. Items analyzed included stories, columns/editorials, "shorts," letters to the editor, and graphic items. Items were analyzed if 25 percent or more of their content dealt with environmental topics.

Findings

The sample used in this study consisted of 217 environmental items drawn from the 126 *Newsweek* items analyzed. As Table 1 shows, the greatest number of *Newsweek* environmental items (57) occurred in 1970, while the fewest (9) occurred in 1969. A steady decrease in the number of environmental items was seen from 1970 through 1974. The samples from 1974 and 1975 each contained 16 environmental items.

Table 1 indicates a steady decline in environmental quality based on the National Wildlife Federation data from 1969 through 1975. However, the Gallup data indicated a steady rise in public concern of environmental pollution from 1970 through 1973. From 1969 through 1975, federal obligations to fight environmental pollution increased as did federal outlays to environmental pollution. However, the rank correlation between the obligations and outlays was not statistically significant at the .05 level. Finally, as mentioned earlier, the fewest number of *Newsweek* environmental pollution items occurred in 1969, and the greatest number in 1970, with a steady decline from 1970 through 1975. In other words, *Newsweek's* coverage of environmental pollution did not correlate at a statistically significant level with the public's concern of this issue, with the quality of the environment, with federal obligations for control and abatement of environmental pollution, or with federal outlays for environmental pollution control.

TABLE 1

COMPARISON OF PERCENTAGE CHANGES BETWEEN REPORTED AIR QUALITY, FEDERAL OBLIGATIONS FOR AIR POLLUTION CONTROL AND ABATEMENT, AND FREQUENCY OF *NEWSWEEK* MENTIONS OF AIR POLLUTION
(Base Year is 1970)

Years	Air Quality/ Rank	Air Control Obligations/ Rank	*Newsweek's* Air Mentions/ Rank
1969	1.03/3	*	.17/1
1970	1.00/2	1.00/1	1.00/7
1971	1.00/2	1.29/2	.86/6
1972	.98/1	1.98/4	.77/5
1973	1.00/2	2.44/5	.54/4
1974	1.00/2	2.59/6	.31/2
1975	1.03/3	1.84/3	.42/3

*No index computed before 1970

Rank order correlation between Air Quality and *Newsweek's* air pollution mentions: $r = -.47$, $p. > .05$.

Rank order correlation between Air Control Obligations and *Newsweek's* air pollution mentions: $r = -.73$, $p. > .05$.

Discussion

As the findings indicate, Newsweek was not found to be a good barometer of environmental pollution. But the question remains: Why did Newsweek cover the environment as it did? The simplist explanation, albeit empirically untested, is that Earth Day (and the media "hype" which preceded and followed this event in April 1970) was primarily responsible for this news magazine's sudden interest in environmental pollution in 1970. However, only four months after Earth Day New York Times environmental correspondent, Gladwin Hill, said one should not ask whether the enthusiasm of Earth Day could be sustained, since this puts Earth Day in the role of a cause rather than of an effect.

If Earth Day were indeed part of a trend, as Hill indicates, this trend, judging from Newsweek's coverage of environmental pollution, was rather short-lived. In the news magazine's own coverage of Earth Day, the event was referred to as a "bizarre nationwide rain dance" which was "wholly inconclusive." According to Newsweek :

> By the time the last auto engine had been symbolically buried and the last orator had spoken out against garbage, the essential question remained whether the whole uprising represented a giant step forward for contaminated Earthmen or just a springtime skipalong (Gladwin, 1970).

If the frequency of pollution coverage found in Newsweek as analyzed in this study is an indication of the magazine's answer to this question, then one must conclude that Newsweek viewed environmental pollution basically as a rather short-term "springtime skipalong."

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TELECOMMUNICATIONS AND GLOBAL ENVIRONMENTAL EDUCATION

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Setting Context

Whether we like it or not, we are experiencing a telecommunications revolution. The quarter of a century since the launch of the space age has brought with it an unprecedented ability to communicate and educate. As we enter the information age we have begun to link the globe in an ever tighter network of satellites, radios and more recently - microcomputers. Using readily available technologies, in a matter of seconds we can now send information to friends or colleagues half way around the planet, network with like-minded professionals whom we have never met before, search comprehensive data bases, or receive on-line consulting from experts in a wide variety of fields. While this medium certainly exhibits tremendous potential, the utilization of telecommunications for global environmental planning and education has been largely untested.

While the transition to an Information Age may be inevitable, the choice of the tools we use and how we apply them is still clearly within our control. As we move forward, certain fundamental questions must be continually addressed. Can high technology in general, and telecommunications in particular, be "appropriate technology"?

The basic questions asked of new technologies during the past three hundred years, in both capitalist and socialist nations, have been simple: do these technologies contribute to economic gain or military clout? These twin criteria are clearly no longer adequate. New technologies must pass far stiffer tests; cultural, ecological, political, social, economic and strategic tests.

Does telecommunications pass these tests? To date, we have been so caught up in adapting and reacting to this new technology that we have had limited opportunity for exploration and assessment of its widespread utilization.

The answer then to the question "Is telecommunications appropriate technology?" is, of course, "yes and no". Yes, it is time to recognize that "high tech" can be appropriate tech. There will be times when the most advanced and most "modern" technology will also be the most genuinely appropriate. And no, there are also innumerable cases where what is simple and traditional can scarcely be improved on.

Although a thorough analysis of the appropriate applications of telecommunications is beyond the scope of this paper, it is important that we carefully evaluate any new technology before we board the bandwagon, and equally important that we continually monitor its application if we choose to utilize it.

An Initial Experiment

In an effort to begin exploration and evaluation of telecommunications and other tools of the Information Age, the Farallones Institute (Occidential, California) and five other organizations involved in appropriate technology and international development applied for and received a grant from the Apple Computer Corporation. The grant provided computers, modems, and communications software to facilitate the evaluation of microcomputer-based communication technologies, using both telephone lines and satellite systems. Joining the Farallones Institute was the Pacific Research Unit of the University of California (Santa Cruz, California); Volunteers in Asia at Stanford University (Palo Alto, California); the Transnational Network for Appropriate Technologies (Rangley, Maine); Volunteers in Technical Assistance (Wahshington, D.C.); and Appropriate Technology International (Washington, D.C.).

Through our initial experimentation we began to see great potential, yet there were significant problems. First, the system we were using was difficult to learn and use- "user-hostile" as opposed to "user friendly". Second, it was limited to "electronic mail". We could send each other individual messages in a few seconds, yet there was no opportunity to post bulletins or participate in on-going discussions. Third, access and on-line fees were prohibitive for most small non-profits. Although we were initially funded through a grant, we knew that eventually we could not afford the price of admission.

We did, however, see tremendous potential for several applications of telecommunications. Perhaps the most obvious is the opportunity to communicate quickly with people all over the world. For example, when villagers in Tonga and Costa Rica had a problem with crumbling cooking stoves (built form homemade cement), they hooked up with our network via a pan-Pacific satellite. Researchers at California universities unearthed the problem: the villagers were neglecting to wash the salt out of the sand they were using in the cement. A return message was sent and the problem was solved. This is but one simple example of the potential for an "Electronic Peace Corps".

Another obvious advantage of telecommuinications is the ability of geographically dispersed groups to communicate rapidly with each other on an on-going basis. From timely information exchange, to agenda formation, to proposal development, to political organizing- telecommunications offered a unique potential.

The challenge remaining before us was to create and then continue experimenting with a system that addressed the obvious problems of an expensive, unfriendly system that was limited to electronic mail. What we envisioned was a telecommunication system for the environmental and international development community that was global, low-cost, user-friendly, and complete with bulletin boards, on-going conferences, and file storage.

From Vision to Reality: ECONET

When grant funding ran out, the Farallones Institute took the lead role. Working closely with the initial group of participants and with the support of the Apple Computer Community Affairs and TymeShare Corporations, we developed a global, low-cost, user-friendly and comprehensive telecommunications network called ECONET. From its modest beginnings, ECONET has evolved into a growing network of over 150 users in a dozen countries.

ECONET consists of an electronic mail system, multiple bulletin boards covering a diverse range of topics (including international development, environment, housing, energy, hazardous materials, agriculture, and health), public and private conferencing systems (for on-going conversations from groups of participants), and a file storage and retrieval system.

The network is very user-friendly, both easy to use and easy to understand. ECONET provides "menus" from which users select the item of their choice. Full user support is provided by "help" files within each menu or by ECONET staff. The network is presently accessible in over 500 U.S. cities and in 65 countries. All connections are made with a local telephone call, except in small towns or remote areas. Perhaps most importantly, ECONET is probably the most inexpensive telecommunications system in the world today. For a $15 (U.S.) monthly account fee, the user is entitled to unlimited electronic mail (anywhere in the world) access to all bulletin boards and public conferences, and unlimited file storage. There are no additional charges for hook-up or connect time.

ECONET also has several unique educational and consulting services. Two groups serve as free on-line consulting services in a wide-variety of environmental areas. The National Appropriate Technology Assistance Service (NATAS) in Butte, Montana and Volunteers in Technical Assistance (VITA) in Washington, D.C. serve network members with technical assistance, educational services, and problem solving. Other consulting services are currently under development.

Because ECONET is programmed and operated by a small non-profit organization, the system is flexible and can be custom-tailored to suit the specific needs of a user group. Several groups already have their own private conferencing system which allows them a specifically designed on-line environment.

ECONET has experienced steady growth. There are already hundreds of users throughout the world who are utilizing ECONET as a tool for environmental planning, education, communication, and advocacy. A small sampling of current users includes:

British Computer Society (London); European Greens (Brussels); Food and Agricultural Organization (Rome); Foundation for the Peoples of the South Pacific (New York); People's Research Institute on Energy and Environment (Tokyo); Promocion del Desarrollo Popular (Mexico City); Sierra Club (San Francisco); U.S. Forest Service (Washington, D.C.); World Information on Energy (Amsterdam); and the World Resources Institute (Washington, D.C.).

Lessons Learned

ECONET has been operating as a comprehensive system less than a year, yet already we have learned several lessons that are worth sharing. First, existing information services (or data bases) are largely inadequate for the types of organizations which currently utilize ECONET. Because they represent a one-way flow of information, questions which relate to a specific context, a particular application and/or a certain location must go largely unanswered. In response, ECONET has developed on-line human comsulting services and support groups which can respond to the unique needs of most organizations. In addition, many of the large data bases were developed for, and are located within, the Northern industrialized countries. For a variety of reasons, including restrictions placed on access of information across national borders, less-developed countries and regions of the South need to develop their own data bases.

Second, the people - not the hardware or software - are the most essential part of any network. Only active users with a desire to communicate and an interest in exploring the potential use of the system can make telecommunications a success. To facilitate active use, ECONET had developed a policy of free unlimited electronic mail and no additional charges for "connect time". Our limited experience has clearly shown that groups of organizations or individuals who are geographically dispersed and desire rapid, regular communications can benefit greatly from a system like ECONET.

Telecommunications is certainly a central part of the wave towards a "post-industrial information society". We believe it represents an extremely powerful tool for environmental educators throughout the world. Like any tool, however, it is only as good as its user and it can be used inappropriately. ECONET represents an on-going attempt to carefully wield the tool of telecommunications towards a safer and healthier planetary future.

EARTHWATCH: A RADIO VOICE FOR THE ENVIRONMENT

By Tom Sinclair
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The Joy of Radio

Radio is perhaps the most taken-for-granted mass medium of the 1980s. After all, Marconi's invention of the "wireless", radio's precursor, is nearly a century old. It was 70 years ago that entrepreneurs schemed to make radios a "household utility." The first commercially licensed radio station in America, KDKA in Pittsburg, began broadcasting in 1920. Radio's "golden age," with innovations like instantaneous news coverage and live entertainment available at the flip of a switch captivated the country in the 1930s and 1940s, but that was 50 years ago. Many of us hadn't even been born yet.

So why should anyone get excited about radio today? I'll tell you why. Radio is still a great way to reach large numbers of people. It has more competition now than it had in the "golden age," especially from television. But 40 years after TV became a truly mass medium in this country, radio is still very much alive. Check the dial and see for yourself. You'll find plenty of stations, and they wouldn't be there if they didn't have an audience.

Television may be more glamourous. But radio has many pluses. Most radios are inexpensive and portable. You can slip a radio into your pocket and carry it anywhere; not so, with most TVs. Radio also is less obtrusive. It doesn't require your undivided attention. You can listen to it while you make breakfast, drive to work, and perhaps even on the job. Try that with your TV.

At the production end, radio is simpler. It takes special equipment and training to produce and braodcast radio programs, but nowhere near as much as television or film. The budget for a TV program or movie can run from thousands to many millions of dollars. Radio programs, by comparison, are remarkably cheap and easy to produce.

Small is Beautiful

My enthusiasm for radio reflects the fact that I co-produce a thriving radio program called "Earthwatch." It is underwritten by the University of Wisconsin-Madison's Institute for Environmental Studies, where I work, and Sea Grant Institute. We've been partners in this venture for 14 years, and it has served us well.

"Earthwatch" is a series of radio features on the environment. It is broadcast on nearly 100 radio stations in the upper Midwest. Most are in Wisconisn, but we also have stations in Illinois, Michigan, Minnesota, Iowa, Indiana, and North Dakota. (Our "Earthwatch," incidentally, is not related to the research-expedition organization of the same name in Massachusetts.)

The program is not elaborate. Each segment is just two minutes long. That's about one, double-spaced, typewritten page of narrative read aloud. We record five new segments every week -- 260 a year. Each is different, but they're all about some aspect of the environment. We define "environment" broadly; recent subjects of "Earthwatch" have included:

--Federal legislation that would reward citizens for blowing the whistle on illegal toxic-waste dumpers;

--A new coating that helps windows in northern climates gain more heat from the outdoors than they lose;

--Attempts by international conservation groups to spare a unique tropical rainforest in Costa Rica from the chainsaws and bulldozers;

--Controversy over the U.S. Environmental Protection Agency's response to health hazards from asbestos in public schools; and

--The relative merits of a farming method that reduces oil erosion but increases groundwater pollution from pesticides.

Because most of our audience lives in the Midwest, "Earthwatch" emphasizes news and information of special interest to people there. But the program includes a healthy mix of features about other parts of the country and world.

Covering complex subjects like nuclear waste disposal in just two minutes is a challenge. It takes concise writing and an ability to reduce complicated subjects to the essentials. Some would find our format too constraining. We ourselves often wish we had more time to say all we'd like to.

Still, brevity is a virtue when you're trying to catch and hold the attention of an audience you never see. By radio standards, a two-minute report is long. Give people anything more and you risk losing them. We sacrifice some depth to hold listeners -- and stations, for that matter. But that gives us a better chance to get the message across before they consider switching to something else. It also enables us to produce more programs and be heard more often.

The Making of "Earthwatch"

Currently, six people at the Institute for Environmental Studies and the Sea Grant Institute work on "Earthwatch." They include both professional writer/editors and students. All have other duties in the institutes' public information offices. We could produce "Earthwatch" with a smaller staff, but we prefer to spread the work around so each person has more variety.

Most of the students work part-time while majoring in environmental studies or journalism. Working for "Earthwatch" gives them a chance to broaden their knowledge of environmental concerns and sharpen their research and writing skills. The student-training element of "Earthwatch" complements the educational mission of our institutes, and it's one reason why the project has been so well-received within, as well as outside of, the university.

Ten steps from my office door, the Institute for Environmental Studies keeps a colleciton of periodicals, books, and other reference materials on a wide range of environmental topics for students and faculty. It's invaluable to the "Earthwatch" staff. That's where we get a lot of our story ideas and background information. We also keep tabs on environmental activities and research at our university and elsewhere, watch for guest speakers from out-of-town, and use our imaginations to come up with interesting stories. We never run short of ideas.

Our writers attend lectures and meetings, interview people in-person and by phone, and write their scripts on deadline. We do not report breaking environmental news; the time lag from recording to broadcast -- a week or two -- is too great. Instead, we concentrate on features and background pieces.

The staff puts a premium on being accurate and avoiding needless jargon. When possible, we also try for a light touch -- to entertain as we inform.

Although we frequently report on political issues and controversies, we do not take sides on "Earthwatch". Admittedly, we have a built-in bias. That's evident in the name of the program and the subjects we choose to cover. But the University of Wisconsin is a public institution, and we feel obligated to provide balanced information so listeners can draw their own conclusions.

We record "Earthwatch" at the studios of the University of Wisconsin's public radio station. A campus media center duplicates the master tapes for weekly distribution by mail to the "Earthwatch" network. Only stations that agree to play the program receive tapes. We send them the program for free, and they play it for free. Then they return the tapes so we can re-use them.

Apart from salaries and overhead, "Earthwatch" will cost us about $15,000 this year. That pays for studio time and duplicating, tapes, postage, equipment, supplies, and other items. Salaries and overhead are big expenses, but because nobody works exclusively on "Earthwatch", it's hard to calculate the program's total cost. My guess is that it's somewhere around $60,000 a year.

That sounds like a lot, but it works out to just $1.15 for each minute "Earthwatch" is on the air. In exchange, we get roughly 860 hours of free broadcast time annually from all of the stations in our network. Based on their commercial advertising rates, we estimate it would cost us about $500,000 to buy that time. I think we get quite a lot of mileage out of what we spend.

The Bottom Line

How have 14 years of "Earthwatch" affected the millions of people who live within earshot of the program? It's difficult to say. We've never done a systematic study, and I'm not sure we would get a satisfactory answer if we did.

Wisconsin is a relatively progressive environmental state. It would be presumptuous to credit "Earthwatch" for any of that. Still, I'm convinced that we have helped raise the environmental consciousness of our audience. Many people I ask have heard "Earthwatch" at one time or another. Some have listened to it for years. And everyone seems to like it; we get few complaints.

On the contrary, we've drawn praise from many corners. The Environmental Protection Agency and regional conservation organizations have cited "Earthwatch" for its work. Wisconsin's governor complimented our program while speaking on campus recently. When "Earthwatch" celebrated its 10th anniversary, one of Madison's daily newspapers congratulated us for "contributing immeasurably to environmental literacy."

We could not have asked for a nicer compliment.

REPORTING ON THE ENVIRONMENT: AN OVERVIEW OF WHAT'S RIGHT AND WHAT'S WRONG

Linda Kuhnke
Battlecreek Inquirer & News
Kalamazoo, MI

A study on environmental coverage in three papers in southwestern Michigan shows that although the number of stories reported in them is fewer than a decade ago, coverage is indeed better--more localized or community-minded and with a greater number of follow-up stories. This is because more environmental problems have been identified and they are being worked on regionally or locally, whereas a decade ago many of the stories were nationally bugeted. Problems in coverage today, however, continue to exist in the style of coverage, which tends to reduce issues to overly simple formulas or to ignore environmental implications/facets completely.

For the purpose of the study, the term "environment" means all stories that pertain to nature and our manipulation of it, inadvertent or deliberate; to the interrelatedness of ecological systems; or to the disruption of those systems.

The papers studied vary in size and circulation. Editor & Publisher 1985 Yearbook reports the following: Battle Creek Enquirer & News has a daily circulation 29,937 for an estimated population of 33,909; Kalamazoo Gazett's daily circulation is 63,308 for an estimated population of 78,579; Three Rivers Commercial-News circulation is 4,308 for an estimated population of 6.957. These figures show that within their various circulation areas, the papers have a readership of 88.2 percent in Battle Creek; 80.5 percent in Kalamazoo; and 61.9 percent in Three Rivers.

The three papers in the study subscribe to The Associated Press news wires, a deliberate choice which allowed another, more general study to see how much environmental and other copy moves on The Associated Press and Gannett News Service news wires each day. (The reason for including GNS copy is that I read the wire daily at The Battle Creek Enquirer & News, which is a Gannett paper.) Reading the wires also provided information on how much material the editors who rely on those services A) are exposed to, and B) have access to.

In the content analysis of the newspapers, done for the first three weeks in February, the percentage of environmental stories was small: for the combined papers over a period of three weeks, environmental coverage was 2.67 percent, or 89 environmental stories out of 3,326. Breraking down the figures, Kalamazoo printed 2.92 percent (50 out of 1,713 stories); Battle Creek published 1.91 percent (21 out of 1,097 stories); and Three Rivers published 3.49 percent (18 out of 516 stories). The percentages changed a bit week by week, depending on the news agendas for any given day. Four stories did dominate the news during the period of the study: the aftermath of the shuttle Challenger crash, the election of Corazon Aquino in the Phillippines, tainted Tylenol capsules and glass slivers in Gerber baby food. Whatever else happened would necessarily be subordinated, especially if an important break occurred in any, some or all of the stories on any given day.

For all three papers, the percentage of environmental stories dropped the second week of the study and rose again the third week, which suggests that the available stories on the news wires may also have correspondingly fallen and risen. A check of what came over the Battle Creek wires did show that except for editorials, the number of environmental stories was fewer the second week and greater the third. What this suggests is that what appears in the paper may correlate to what the news wire services submit to their member papers. David White's classic study of how a wire editor chooses copy suggests one of the factors influencing news choices is the number of times the news services run a particular story. (390) I suggest, also, that inclusion in the AP News Digest--a menu or list of stories the service considers to be important may also influence editors' choices. For the three week period, 54.5 percent of the 33 AP stories used were listed in News Digest. Only five News Digest environmental stories were not used in any of the papers.

Although the papers used 33 AP environmental stories for the three weeks, during that time they used even more locally generated environmental copy. Forty-two of the 89 environmental stories, or 47 percent, were written locally. Some of those pieces were very short--announcements of seminars, meetings, and awards. Other stories regarded ongoing discussion--dredging rivers, saving trees on a roadway, aquatic weed control, sludge applications. A landfill and its potential hazards has been a subject for debate for 10 years now; the aquatic weed problem on recreational/residential lakes did not happen overnight; a car shredder had caused neighborhood complaints of vibrations and noise for several years now. Environment has become a part of the reporting within the community.

A decade ago, newspaper stories about environmental issues were usually generated from Washington, D.C., or the state capitals. Environmental crises appeared to have developed elsewhere. Issues such as fluorocarbons in aerosol cans, the Concorde jet's flights, red dye #2, Congressional debates covering such subjects as clean air, solid waste disposal, toxic substances, and water were somewhat easier to ignore, if Van Liere and Dunlap are correct. They say environmental concern correlates positively to urban residence under the following condition--"residence is most strongly associated with environmental concern when local environmental conditions are the focus of attention." (191) The national issues remain, but the focus for the newspapers in southwestern Michigan has shifted. Journalists have localized environmental coverage.

The numbers of environmental stories in the papers has shifted also. Fewer environmental stories than 10 years ago are being published in the two larger papers in the study. The Kalamazoo Gazette used 28 environmental stories for the week of Feb. 9-13, 1976. The same week in 1986, the paper used 18 stories. Coincidentally, the landfill story which broke for the first time in February 1976, was again in the news, this time centering on a discussion about whether cleanup funds would be available and who would pay what part of the cost. In Battle Creek, the Enquirer used 11 stories for the same week (the week of Feb. 9-13, 1976) compared to nine environmental stories for the same week a decade later. The Three Rivers Commercial-News printed the same number of environmental stories for that one comparative week: six. One of the six stories from 1976 concerned a proposal to dredge the Rocky River-- a plan that finally was realized this year and was much in the news in February 1986.

Some problems besides the number of stories continue to exist in environmental coverage. The beat is difficult because it covers many topics, some of which are considered the province of other reporters. Land use may be covered in city or county beat, while pesticides come under agriculture and gardening page, and game management under outdoor pages. An environmental reporter, to do a thorough job, must be acquainted with all of the topics, and more. R. Jeffrey Smith, writes: "No single reporter can expect to become an expert on the regulation of pesticides, toxic wastes, air and water pollution, radiation and noise." (29)

On February 13, The Associated Press reported that Michigan ranked seventh nationwide in Superfund cleanup funds, a story which appeared in both the Battle Creek Enquirer and Kalamazoo Gazette, each having a reporter designated "environmental." The AP lead, dateline Washington, read: "Michigan ranks seventh nationwide in the amount of long-term Superfund cleanup assistance it's gotten from the federal government over the past five years, a report says." The story went on to say the Federal Funds Information for States System, which issued the report, said the state ranked fourth in emergency cleanup funds and that Michigan ranked second of all states for the number of proposed sites eligible for Superfund cleanup aid. Michigan sites numbered 64: New Jersey, ranked No. 1, 98: and California, in third, 60. The Battle Creek reporter added to the AP story that a local well field was on the Superfund list and that several million dollars have gone to various aspects of that problem. The Kalamazoo story was not localized. It ran as a state story as found on the AP wire. But the AP story is misleading. The information is taken out of context, making Michigan appear to have more need for funds due to the number of sites around the state. It simply isn't so. What is true is that Michigan began identifying hazardous waste sites earlier than many other states and therefore has been able to identify more of them. The information is available through the state Department of Natural Resources. In short, it is available to anyone. But it was not included in the story. Readers were given the wrong impression about the news.

Michigan is not unique, as many articles in professional journals testify. Article after article urges reporters and editors to put environmental issues into context. The professional articles presuppose that environment is part of the news agenda now, and this presupposition is borne out by the results of this study. But journalists must learn to ask the right questions and then to put the answers into proper perspective. Only then will readers be provided all the information they need to form educated opinions regarding environmental issues.

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BUILDING AN ACCURATE INFORMATION BRIDGE BETWEEN THE ENVIRONMENT AND SOCIOECONOMICS

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Environmental education happens through environmental educators in every discipline at every age level. During and following the transition to an information age, environmental educators will carry a heavy responsibility to insure that accurate information concerning all aspects of the environment is being disseminated. It is imperative that not only environmental educators, but educators in every discipline, and especially the whole communications-information industry have a thorough understanding of relationships between earth's sustainable resource base and the money-flow required to facilitate the equitable distribution of goods and services on a global scale. Growth, development and trading must be calculated on sustainable practices in every nation.

The time has come in the history of environmental education and socio-economics that the basic meaning of economy must be restored. The differences between economy, economics and money need to be made clear in both the educational and business aspects of the holistic approach to environmental education.

The purpose of this presentation is to make available only a minute portion of the data and environmental realities being faced, which will aid society in correcting and bringing into balance the sustainable yields or production of goods and the money-flow required to enable humanity to share the fruits of their own labor and the value of their own resources. It is here suggested that it will be money-flow and not hoarded or misspent wealth which will ultimately bring about the kind of societies we all want to share planet Earth with.

Very much has been written about "back to basics" in education. Provision for food, clothing and shelter is and always has been a very basic reason or purpose for the whole educational process. Without education or knowledge of the total environment in which an individual or nation lives, it is not possible to utilize the available resources to provide for those primary human needs on a sustainable level.

The difference between economy, economics and money has been understood clearly throughout history. The original meaning of economy was 'the law of the habitat'. (Eco - habitat or surroundings, nomy - system of laws governing) This system of laws expressed a concept of laws beyond human control such as astronomy, agronomy, etc. Economics was the process of studying, understanding and managing the habitat and resources of any given part of the Earth which people inhabited. From the beginning, consideration had to be given to living in harmony with natural conditions. Economy, then, was nature's realm; economics was man's. The human realm has always been subject to natural law. We humans are forced to learn this over and over again through floods, famine, drought, hurricane, hail, gluts due to good growing conditions, accidents in the air because a natural law was violated, and in a host of other ways. These basics environmental educators cannot forget. They are the ones who understand them best. It appears that economists have lost their mission. Monetary manipulation rather than the wise use and management of Earth's resources has become the standard. After all of the definitions of environmental education are analyzed, they bring us back to the original meaning of economics.

Another basic that environmental educators are well aware of is the environment, surroundings and habitats provide the basis for living or survival in all habitable portions of the Earth. These differ according to the natural order of mountains, oceans, grasslands, rivers, prairies, plains, deserts, the arctic, antarctic, or tropical lands. Each provides different resources to be knowledgeable about, to manage or steward, and to trade. Early on in history, various forms of money were created to facilitate trade or the flow of goods and services. Whenever money or wealth has been loved for itself or the control over others that it represents, it has become the "root of all evil." This has been witnessed from time to time throughout recorded history.

A case in point is the present crisis in rural America. The post-war psychology of more, bigger, faster, better allowed for expansion beyond a sustainable base. Balance betweeen the productive capacity of the land, consumption, and money flow was forgotten or ignored. In the mad scramble for wealth and power, the equitable exchange of goods and services between the resources rural America provides and urban America consumes has been upset. Here in the highest grain and meat producing area of the nation, the costs of interest, fuel, energy, insurance, and machinery have exceeded the productive capacity of the land. In search of a better monetary return, producers turned to irrigation, fertilizer, pesticides, draining prairie potholes, plowing marginal land, destruction of tree belts, and other expensive practices to increase production to increase the monetary return. Now the rural people are being forced off the land and from the small towns and communities. Homes and buildings built up over a lifetime are being left to disintegrate. The home site becomes valueless to both the family and the foreclosing agency. The increased production further depressed prices. All segments of the rural money-flow are caught in an imbalance. The banks, oil industry, energy industry, and businesses on main street rural America all suffer together. These facts have been documented over and over again.

Imbalance in money flow is also extended to other resources in other nations, especially third world countries (Ronald J. Sider, Rich Christians in an Age of Hunger, Ch. 1 and 2). Their populations remain poor. Environmental educators are qualified to be in the vanguard to help remedy many monetary problems worldwide that are the result of abused, misused and unshared resources.

The need to acknowledge environmental and money-flow factors and relationships during and beyond the transition to an information age is apparent. The basic need for food, clothing and shelter provided from Earth's resources will continue for the foreseeable future. Economic growth and progress are agreed upon goals. However, a sustainable foundation must be built on a clear understanding of Earth's ecosystems and biosphere. Those producing raw materials from the natural habitat must be adequately compensated to assure continued production. Mother Nature and agriculture cannot be effectively unionized. Environmental factors beyond human control, such as frost, hail, blight, insects, disease, or floods, prevent it.

It perhaps should be considered that in the process of transition to an information age, that the supply-demand cycle can be reversed to a demand-supply cycle with a great saving of resources. Why pay to store commodities which cannot be traded or consumed by hungry people? Why pay to produce goods which cannot be either traded or used by those needing them most. Why pay for non-production of a product that is already in over-supply? A demand-supply cycle would be much more appropriate. It could be the wave of the future which will stabilize negative impacts on soils, waters and the air. Renewal of rural America may lie in the hands of the communication-information industry. The assurance of a continued, affordable food supply may also lie with it.

The nations possess the knowledge, technology, resources and skills to eliminate hunger, nakedness and homelessness from the face of the Earth. It is here suggested that those involved in the technology and distribution of information must assume a heavy responsibility and moral obligation to assure that all of Earth's populations share a monetary reward for supplying basic needed resources, including resources used for non-essentials. It is also suggested that they become involved in the distribution of information discouraging misuse of harmful substances of all kinds. U. S. News and World Report for August 25, 1986, carries an article by Journalist James Mills which says, "Drug profits earn interest of almost $3.5 million an hour. The inhabitants of Earth spend more money on illegal drugs than on food or housing or clothes." Environmental educators would do well to give consideration to this use of land, resources, skills, and trade in face of starvation and ignorance which education can help cure if young minds are not first destroyed.

Another environmental-resource factor related to money-flow is the national debt. In their book Stealing From Our Children, Robert H. Schuller and Paul David Dunn ask, "Why are the print and electronic media virtually silent on the underlying debt?" They were speaking of the interest on the national debt. Here again, resources, information, money-flow or debt are all closely related to environmental-socioeconomic factors. Environmental educators, by the very broadness of their vision, are in a position to address these concerns in a positive manner at all educational levels. Both debt and drugs are related to the needs of the people in rural America and rural areas of the world for monetary resources. Provisions were made in the U. S. Constitution for money to be our slave or servant, not our master. Since 1981, 26 state legislatures have passed resolutions or memorials to Congress for judiciary hearings relating to a stable debt-free money supply. The most sovereign right provided by the U. S. Constitution is to create and circulate debt-free money through the U. S. Treasury (Mobridge Tribune, August 20, 1986, P. 3, Carpenter files for legislature). Rural America is concerned because our homes, land and living are being threatened by interest on debts out of proportion to the land's productive capacity.

Perhaps it lies within the capabilities of the information and computer segments of society to calculate the workings of a demand-supply system which could have the effect of eliminating boom and bust cycles without interferring with free enterprise or the democratic process. Excesses could be controlled and funds channeled to other beneficial uses of land.

There is no shortage of studies and research on what is necessary to produce a world-wide sustainable life-style conducive to good health and well-being. In fact, there is a plethora of significant, accurate and readily implementable information. Using it lies within the human will and decision-making process. The power of the media here is undisputed.

In building an accurate information bridge between the environment and socioeconomics, environmental educators are challenged to:

1. Provide accurate information on the relationships between different environments, resources available in those environments and an adequate money-flow to enable the inhabitants to utilize the resources for their own well-being first and then for trade.
2. Consider the birthright of states or nations and the individuals in them to an equitable financial return from the fruits of their labor with the resources their environment provides.
3. Provide information which will cause people of all ages to become aware of environmental, money-flow factors in all socioeconomic situations and decision-making processes.
4. Encourage the information industry to become knowledgeable and vocal concerning the balanced, sustainable use of Earth's resources, with equity in distribution.

Environmental educators are faced with the task of building a strong, broad and accurate information bridge between environmental realities and socioeconomics. You will do it. Good luck and blessings.

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BIBLIOGRAPHIC DATA BASES:
PRECURSORS OF AND CONCOMITANTS TO THE INFORMATION AGE

John Disinger
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Massive quantities of targeted information have been available through computerized data bases for nearly two decades; more information is continuously added. Escalating developments in the technologies of information transfer make these data increasingly retrievable and accessible. However, there are "costs" to those who would use this information. Perhaps as significant as financial outlays are the costs in terms of learning how to use these technologies, including both their possibilities and their limitations.

COMPUTER-LINKED INTERACTIVE VIDEOTAPE PROGRAMS:
INFORMATION AGE APPROACHED FOR ENVIRONMENTAL EDUCATORS

Thomas Hudspeth
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Computer-linked interactive videotape programs with random access capability offer promise to environmental educators willing to take advantage of two by now fairly-well accepted yet reasonably priced "Information Age" tools: the microcomputer and the videocassette recorder/player. All the steps (including selection of hardware and choice of videotape over videodisc technology) in the development of a computer-linked interactive videotape program on the topic of "Environmental Education and Interpretation Resources in Chittenden County, Vermont" with the help of students in a university environmental education course will be discussed. The limitations as well as promises of these "Information Age" technologies involved will be considered.

ARTIFICIAL INTELLIGENCE, EXPERT SYSTEMS, AND EISE - THE NEW ENVIRONMENTAL EDUCATION

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Center for Information and Communications Sciences
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A key factor in the Information Age is and will increasingly be Artificial Intelligence (AI), which is simply the capability of a computer to perform many of the problem-solving functions traditionally associated with human intelligence, such as reasoning, learning, and self-improvement. Microcomputer knowledge-based AI systems are now here for the environmental educator and will quickly usher in Environmental Information Systems Education (EISE) - The New Environmental Education.

THE BALD EAGLE IN MYTH AND ITS USE AS A COMMERCIAL SYMBOL

Dr. Mark A. Larson
Humboldt State University

The primary emphasis of this paper and accompanying slide presentation is upon the use of the bald eagle in commercial advertising art and the association appeals linked to it. My thesis is that commercialization of this endangered species as a symbol may have negative impacts upon the educational efforts to protect this species.

The biological background of the bald eagle has been studied extensively elsewhere; this paper traces the development of the use of the bald eagle as symbol -- "for all that is strong, courageous, free and wild." I begin by tracing the role of the "king of birds and bird of kings" in mythology and historical accounts.

Slides are used to illustrate the transition of the bald eagle from mythological symbol to advertising icon.

International EE

ENVIRONMENTAL MANAGEMENT EDUCATION: A MODEL FOR INTERNATIONAL DEVELOPMENT

Robert E. Roth
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A model for the strengthening of developing countries' Environmental Education and Information capabilities for building an appropriate institutional framework to deal with conservation problems and sustainable renewable resource development is presented utilizing the Dominican Republic as the setting within which the project was implemented. Public environmental management education and training programs were implemented to help establish sound renewable resource management plans, developmental goals, and to instill an environmental ethic. Evaluative approaches are presented in relation to program and workshop effectiveness, including knowledge gain and attitude shift in relation to selected environmental management issues.

Environmental Management Education Defined

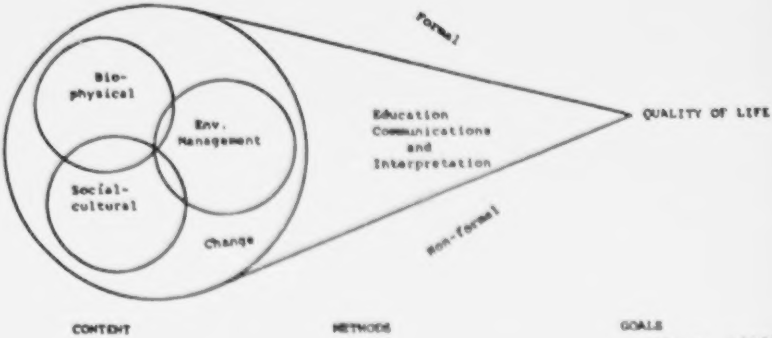
Environmental Management education is concerned with an individual's self understanding, an understanding of the co-inhabitants of the Earth, and interrelationships within and among each of these constellations of concern. A major goal is to encourage the individual to develop the ability to make thoughtful decisions which will create an environment that allows one to live a quality life. Specifically, environmental management education is concerned with developing a citizenry that is:

1. knowledgeable about the biophysical and socio-cultural environments of which man is a part;
2. aware of environmental problems and management alternatives of use in solving those problems; and
3. motivated to act responsibly in developing diverse environments that are optimum for living a Quality Life. (Roth, 1969)

A list of 112 concepts was submitted to a panel of experts (comprised of Ohio State University personnel) representing the various disciplines, organized according to topic and arranged in the order of importance on the basis of Q-sort response. A consensus was reached both as to placement in a major area and as to degree of importance (Bowman, 1972).

The concepts important to know in environmental management education (Roth, 1969; Bowman, 1972; Townsend, 1982) were grouped into four categories: Bio-physical, Socio-cultural, Environmental Management, and Change. Each cluster of concepts is viewed as existing on a continuum and the four areas are represented as spheres on the following model. The four areas are considered to be interrelated. The conceptual core is applied through "Educational and Communication Processes" comprising a range from formal education to nonformal communication strategies. The major goal described on the right side of the model is "Quality of Life" which can also be interpreted as the individual's conception of achieving a workable Environmental Ethic.

Figure 1. The Model for Environmental Management Education



(Roth, 1973)

The Dominican Republic Example

The Dominican Republic's natural resource base is deteriorating at an alarming rate. As indicated in the recently completed Country Environmental Profile (Hartshorn, 1981), erosion rates per hectare in most of the nation's watersheds are estimated to average 300 metric tons per year. Since erosion rates of between 10 and 30 metric tons per hectare are normally considered excessive, the erosion rates in the Dominican Republic are little short of catastrophic.

The massive destruction of the watershed areas is exhibited throughout the country. Every year millions of tons of the nation's most productive land base is washed away as hillside areas are denuded and covered with massive scars from landslides, washouts, and deforestation. The color of the rivers are now a bright brown indicating the increased soil loads in the water. Due to the lack of hillside vegetation cover, the unusually heavy rainfall from two hurricanes dumping 21 inches of rain in seven days has taken on calamitous proportions causing major flooding throughout the country. Sedimentation is filling up the nation's reservoirs. The useful lives of multi-million dollar hydro-electric facilities have already been cut to less than half by siltation. In addition, siltation damage to hydroelectric facilities often results in lower-than-planned power output levels and frequent power outages.

Fortunately, the situation can still be reversed. The degradation of the country's watersheds can be brought under control before the point of irreversible environmental degradation is reached. Time is short, however. It is estimated that within 20 years, the landscape of the dominican side of the island will resemble that of its neighbor, Haiti.

A major activity under this component is the strengthening of the Dominican Republic environmental education program. Under this activity, the efforts to generate more public and target group awareness of the natural resource problem and ways to deal with it are being strengthened and expanded. Training workshops are also carried out for school teachers, local leaders, and small farmers to increase local participation in conservation activities. A viable approach to changing hillside farming behavior patterns which can be replicated in other critical watersheds is the goal. It is expected that the project inputs and the spread effects from project activities will cause sufficient numbers of hillside farmers to implement improved conservation practices in order that stabilization of natural resource degradation can take place within a watershed, within the coming decade, and in a cost-effective manner.

Objectives of the Environmental Management Education Project in the Dominican Republic include the following:

1. Development of a comprehensive national plan for environmental education.
2. Development and testing of alternative communication techniques to strengthen awareness of resource issues.
3. Training of teachers, leaders and farmers in conservation concepts.

Specific inputs include:

1. Short courses for teachers, leaders and farmers.
2. 225 one-day workshops for farmers.
3. Purchasing of educational equipment, electrical generators, buses and vehicles.
4. Development of a training center at Jimenoa.
5. Providing three person-months of technical assistance.
6. Receiving four persons from SURENA to enroll in long-term training in environmental education and communications.

The Environmental Education component of the project utilizing the proposed model for Environmental Management Education (see Figure 2) is making significant progress both at the national, as well as at the watershed levels. Posters, written bulletins, pamphlets, radio programs, T-shirts, bumper stickers and video tapes of the project have been prepared for the mass media program. Curricula for targeting specific concepts grades 1-6 have been designed, although this goes beyond the original project activity. A number of short courses are being designed with different target groups in mind. Construction of the Jimenoa Training Center is nearing completion.

Environmental Education Workshop Effectiveness

The specific objective of the EE workshops was to make small farmers aware of natural resources problems and conservation practices, which were related to their activities as part of the environment. In this sense, small farmers have been taught about the relationship between the environment and themselves, as well as their relationship with natural resources. By conducting these workshops, it was expected that small farmers would be encouraged to accept the conservation practices recommended by the soil conservation agents. This function was especially significant since the Agricultural Extension Service is not concerned with conservation practices; thus, extension agents do not promote them (Veloz et al., 1985).

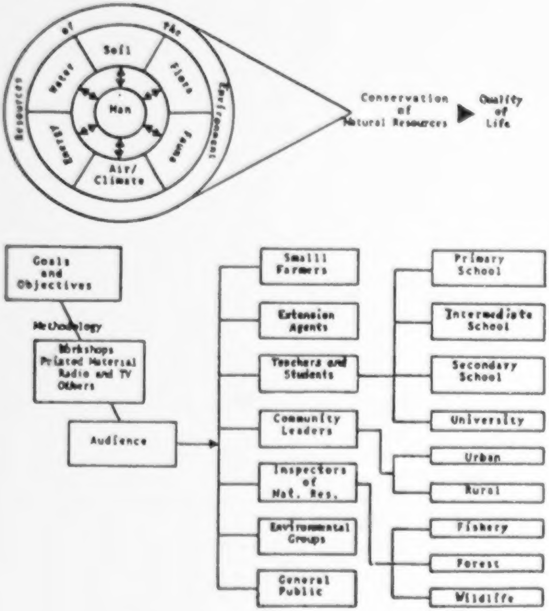

Resources of the Environment
Soil
Flora
Fauna
Air/Climate
Energy
Water
Man
Conservation of Natural Resources
Quality of Life
Goals and Objectives
Methodology
Workshops
Printed Material
Radio and TV
Others
Audience
Small Farmers
Extension Agents
Teachers and Students
Community Leaders
Inspectors of Nat. Res.
Environmental Groups
General Public
Primary School
Intermediate School
Secondary School
University
Urban
Rural
Fishery
Forest
Wildlife

Figure 2. Model of the Environmental Education Program Being Implemented in the Dominican Republic.

Although over 100 workshops have been conducted, in both Ocoa and Las Cuevas watersheds, the impact of this activity on small farmers' attitudes and knowledge had not been determined. Thus, this study was an attempt to evaluate the effectiveness of EE workshops addressed to small farmers in the Ocoa watershed. The results of this study could be useful in assessing other EE programs in other watersheds in the Dominican Republic and other Third World countries with similar conditions. Similarly, this study may make a contribution to the field of environmental education, since it was carried out in the developing country with a target population which has not been considered in previous research related to environmental education.

Problem Statement

This study is centered upon the question: Did the EE workshops conducted by the NARMA staff cause an impact on small farmers' environmental knowledge, conservation attitudes, and adoption of recommended conservation practices?

Objectives of the Study

The objectives of this study were:

1. To assess whether or not EE workshops conducted by the NARMA staff produced a gain in the small farmers' knowledge about environmental issues.
    a. Do EE workshops help small farmers identify environmental issues in their community?
    b. Do EE workshops improve small farmers' awareness of environmental problems and capability to face such problems?
2. To assess whether or not the EE workshops conducted by the NARMA staff caused shift in attitudes held by small farmers about recommended conservation practices.
    a. Have the EE workshops conducted by the NARMA staff influenced small hillside farmers' decision to use conservation practices?
    b. Are small farmers willing and able to teach other "compesinos" about conservation practices after attending EE workshops?
    c. Are small farmers willing to continue using conservation practices after the end of the NARMA Project?
    d. Are small farmers' decisions to use conservation practices only influenced by the NARMA Project credit?

Design

Information was gathered utilizing a survey questionnaire designed to be applied using a face-to-face personal interview technique. This technique was used because a high percentage of the small farmers have not had schooling. It has been found in a previous study that about 38 percent of the farmers cropping in the zone had not had schooling (SEA/IICA, 1982). The instrument used was first elaborated in English and then it was translated into Spanish for application to a population from a Spanish speaking country, the Dominican Republic.

Groups of item-questions were assigned to relate to each objective of the study. The final 13 pages of the instrument included 10 open-ended items, 30 closed items, and 20 multiple choice questions, as well as 34 statements organized according to a modified Likert-type scale. Interviewees answered a total of 94 questions.

Interviewers spent 14 working days applying the survey questionnaire. The survey was conducted during the summer of 1985. During this period of time, 24 communities dispersed throughout the watershed were visited.

Data Analysis

The data from the survey questionnaire was coded, scored, and tabulated for analysis.

The principal statistical procedures used in the analysis of the data were the chi-squared statistic, the t-test, and the Tukey's Studentized Range (HSD) test. The Tukey test was utilized to compare responses among the four groups and between the groups that have participated in conservation activities and the groups that have not participated.

By using the chi-square statistic, the values which represented the differences between observed and expected frequencies falling into each cell of the two-way tables were obtained.

Results

The four groups of small hillside farmers studied in this investigation showed similarity in their general knowledge of environmental issues and conservation practices, as presented in the results of the analyses made. Moreover, it could be said that the evidence reveals that the level of knowledge of the farmers interviewed met the expectation of the EE program being implemented in the Ocoa watershed.

Though the four groups were not significantly different in their responses to items about environmental knowledge, it cannot be concluded that the EE workshops have failed in the achievement of the pursued objectives.

The same conclusion can be made regarding the results obtained when farmers that have participated in the EE workshops were compared with farmers that have not participated in the workshops. The similarity of knowledge shown by both groups of respondents cannot be taken as a failure of the EE program. But on the contrary, it could be speculated that because of such activities "campesinos" of the Ocoa watershed have increased their environmental knowledge.

In regard to the result of the comparison analyses of items concerning farmers' attitudes toward environmental conservation, it can be deduced that farmers generally showed a positive attitude toward environmental conservation. It can be concluded, therefore, that farmers are willing and able to participate actively in conservation activities in the watershed.

In addition, most of the farmers showed willingness to apply conservation practices even after the end of the NARMA Project or if they received little technical assistance. This kind of result was a desired outcome from the conservation activities being implemented in the Dominican Republic since the Government cannot afford to support "special" conservation projects. In this context, it is expected that farmers may adopt conservation practices in the same manner that they have adopted other cropping practices. However, it cannot be ignored that several farmers have shown uncertainty in continuing to use conservation practices after the NARMA Project and with little technical assistance. Generally, it can be speculated that the EE program has played an important role in the positive attitudes shown by the interviewees.

The uncertainty in teaching other "compesinos" that was found does not mean that farmers are not willing to share their knowledge with others; on the contrary, it represents a comprehensive attitude because farmers included in the group named "others" have not been participating in any conservation activities. Therefore, it could be concluded that they do not have the necessary skills to teach others about conservation considering that very few of the members of this group have applied any practice of conservation.

In relation to the organization of the EE workshops in the watershed, it can be concluded that because half of the respondents have not attended any of the EE workshops claimed that they were not invited to participate, organizers of the EE workshops may be using a selective approach to choose farmers or for some other reason are not involving all the farmers from the communities where they are operating. If the former speculation is true, the assumption that every farmer has the same opportunity to participate cannot be considered as valid. Certainly, the program of EE was designed to reach every available individual in a given community where an EE workshop was to be held.

Since the NARMA Project was found to be the major sponsor of the EE workshops in the watershed, it can be assumed that most of the farmers participating in the EE workshops came from the limited areas where the NARMA Project has undertaken activities of soil conservation and reforestation, which in turn could limit the clientele of the EE program.

Researchers such as Southgate et al. (1984) have postulated that incentives should be offered to motivate farmers' adoption of conservation practices. In this study, however, it was found that farmers were more concerned about controlling soil erosion than receiving incentives. It may be speculated that this result has some relationship to the level of environmental knowledge shown by the respondents. It also may be said that access to the EE program, which was a type of extension for natural resources conservation, is associated with the level of awareness of erosion as a problem. Erbaugh (1983) and Veloz et al. (1985) found that agricultural extension (in the Dominican Republic) does not promote conservation activities.

This conclusion is also related to that stated by Nowak (1982) when he noted that to adopt remedial technology, it is necessary to recognize a need. In this context, if farmers are aware of the need for erosion control as they were shown to be, it is expected that they will be willing to adopt conservation practices.

A final conclusion of this study is that farmers appear to be most motivated to apply conservation practices since the implementation of the NARMA Project in the watershed. This conclusion is based on the data that show that most of the farmers have, for up to two years, applied conservation practices.

Implications

The results of this study suggest some modifications to the program of EE being implemented in the Dominican Republic, especially to the EE workshops addressed to small hillside farmers. First, this study suggests the need for a revision of the content of the EE workshops. Second, a revision of the follow-up activities is indicated. In addition, it may be necessary to redefine the approach used to select the clientele of the EE workshops, in terms of both communities and individuals. Finally, it may imply a redirection of the EE workshops objectives. The redirection could be in establishing more specific and measurable objectives, which in turn permit a more direct linkage among the different segments of the population in any given watershed.

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MORE ENVIRONMENTAL EDUCATION AND INFORMATION FOR THE FARMERS COMMUNITY - COUNCIL OF EUROPE INITIATIVE

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The Council of Europe - a short introduction

The Council was founded in 1949 as an international organization of 21 democratic nations in Europe, including 10 member-states of the European Community. The headquarter is Europe Palace in Strasbourg, one of Middle Europe's most beautiful and traditional towns.

The aims of the Council of Europe are

- the promotion of a closer interrelation of the European countries,
- the protection of democracy and human rights.
- the improvement of the living conditions.

Next to protection and the enhancement of democracy in Europe and to an increased recognition of human rights and social welfare, the protection of the environment is a major Council of Europe objective.

Environmental Education and Training in Agriculture

Under the supervision of the "European Committee for the Conservation of Nature and Natural Resources" a "Group of Consultants on Environmental Education in Agriculture and Forestry" was founded in 1983 in order to support the Council's campaign on Environmental Education and training.

This Group is joined by participants from Belgium, Germany, Greece, Netherlands, Portugal, Sweden, Switzerland, Great Britain, as well as observers from different governmental and non-governmental organizations.

The educational objectives and proposals for action in this special field of work are

- to develop an awareness among farmers of their responsibility towards the natural environment,
- to get them to examine the effects of their everyday activities on the natural environment,
- to propose alternatives, appealing to their common sense and capacity for observations.

and therefore

- to examine the curricula of agricultural colleges in the various countries and - if necessary - propose reforms in this area of education in order to take the environment more fully into account,

- to consider the problem of teacher training for agricultural colleges,
- to consider the problem of teacher training for agricultural colleges,
- to review the steps that have been taken in the various countries to develop awareness on the part of farming associations and their members.

Let me give you an idea of what we plan to do with farming associations for example:

> These associations have an important part to play in training and educating farmers. They publish special journals and have a great influence on the farmers general information. So it would be appropriate
>
> - to organize courses, seminars, lectures and round tables for their leaders.
> - to encourage these associations to collaborate with representative environmental protection associations.
> - to get them to take certain steps to encourage farmers to play an active part in improving the environment.

Environmental Education At Agricultural Colleges

In 1985 the Federal Republic of Germany submitted a study to the group of consultants on environmental education in agriculture at the Council of Europe, examining the situation at agricultural colleges. This study was carried out under my direction at the University of Essen Centre for Environmental Education. Some few aspects shall be referred to in the following.

Considering the fact that the efforts to intensify environmental protection through educational measures have been discussed in our country on a broader basis for about ten years only, one must make it very clear at the outset that there is environmental education included in the curricula of all agricultural technical colleges of our country.

There is, however, a difference in the degree to which environmental subjects have been incorporated in the curricula of the various Federal States. And there are big differences among the various subject matters and between the two types of colleges, too.

In most cases, environmental subjects are included mainly in the curricula of the classes dealing with the production of agricultural products in practice (crop production, livestock production, agricultural machinery and farm buildings, etc.). After the first promising beginning of the integration of environmental subjects in the curricula of agricultural colleges, the next step, in addition to a regional harmonization, should be to see to it that the existing possibilities are used in an optimum way.

Recommendations for the Environmental Education of the Farming

Community

The results of the German study on environmental topics at agricultural colleges gave reason, particularly to refer to this aspect within the range of recommendations. The list of recommendations was worked out by myself as the German representative in the group of consultants in winter 1985/86 and is currently discussed and revised by all group members.

Let me now, anticipating a Europe-wide presentation and discussion, present some of the essential parts of these recommendations.

Principles

In view of the numerous and comprehensive problems in our environment, information and education in the agricultural sector, as in other areas of work and training, should be based on the following principles:

1. environmental education is a life long process;
2. it requires continuous reorientation towards changing situations and ideas.
3. the promotion of environmental education is not restricted to technical/natural science or administrative questions; it also includes ethical, moral and religious aspects.
4. the aim of increasing environmental awareness is not merely a theoretical ideal, but must be based on existing systems for disseminating information and providing education. These include: the agricultural training system, the agricultural press, the local and regional associations of farmers with their education and information branches, the government and commercial agricultural advisory services and specialist organizations bringing together conservationists and agriculturists.

The Agricultural Training System

There is no single agricultural training system throughout member countries of the Council of Europe. In some countries and in some rural areas, it is often the general education systems which provide much of the agricultural training. Many young farmers do not attend any agricultural technical college.

In principle, it is no longer possible for young farmers to train for their job and obtain sufficient skills only on their parents farm; they also need technical training at school or college, especially since the advent of modern technology and chemistry. And it is where environmental education and information must be integrated into existing and future training systems. In this context, it is necessary not to deal with the aspects of environmental protection as a separate subject but to take up these issues in the context of the various other subjects in syllabus.

Agricultural Press

In many member countries of the Council of Europe, there is a wide range of possibilities for influencing the farming community through the press. The following areas should be mentioned:

Agricultural Journals

These are often the main source of information used by farmers. As advertising is the main source of finance for these journals, it makes up a large part of their content resulting in an image which is often characterized by modern agricultural technology and agricultural chemistry. Such journals contain only meager coverage of environmental problems.

Periodicals & Information Sheets Published by Agricultural Organizations and Associations

In this field there is possibly a higher degree of independence. It may be useful to sensitize publishers, editors and their staff through special training courses on environmental problems in agriculture. Close cooperation with government environmental agencies and independent environmental organizations should be considered.

Agricultural Advisory Services

In the countries of Europe, there is a great variety of different advisory services available to farmers dealing with, for instance, the selection of appropriate varieties of crops, livestock management and breeding, the use of fertilizers and pest control and the timing of agricultural activities.

These advisory services, which may be organized by the government or by private associations or commercial firms, can have a major influence on the practical behavior of farmers.

Conclusion

The principles and activities described in this paper need to be adapted for each country within the Council of Europe and incorporated into plans for the future. It is recommended that each country in the Council of Europe should examine the principles and activities listed in this paper and produce a national policy for environmental education of agriculturists and a plan for its implementation.

NIGERIA: TRANSITION TO AN INFORMATION AGE

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Introduction

Through Nigerian newspaper and magazine accounts, lengthy conversations with Nigerian colleagues and students, and observations made while on a month-long trip to Nigeria in May and June of 1986, I have at least glimpsed some of the complex problems facing this tropical, populous country's citizens as they attempt to make a transition to an information age.

As in many developing countries, affluence and high technology often appeared side-by-side with poverty and back-breaking manual labor. A notice in a library in Lagos, announcing the agenda for the monthly meeting of MacIntosh users, served as a reminder that many urban dwellers are well aware of the information age in which much of the economically developed western world is immersed. In contrast, a notice on the mud wall of a health office in northern village, announcing that there would be running water one hour per day three times a week, reminded one that very basic services people living in an information age take for granted are still absent from the lives of many in Nigeria.

Background Information

Among the countries of Africa, many consider Nigeria "the giant" of the Brazil of Africa. It is the home of nearly one out of every five Africans and its burgeoning population is expected to reach a hundred million within the next decade. It is approximately the size of California, Arizona and New Mexico combined and includes within its borders more than two hundred ethnic groups. From the coastal swamps near Lagos to the savannahs of the central portion of the northern desert areas, it is a land of contrasts and contradictions.

Since gaining its independence from Britain in 1960, Nigerians have struggled through a debilitating civil war to become black Africa's wealthiest nation. In the early 1980's, its gross national product was more than half that of the other forty-five black African nations combined (Lamb, p. 301). Prior to the discovery and rapid development of crude oil, it was a major exporter of cocoa, palm oil and ground nuts. It was self-sufficient in the production of food and well on the way to developing a comprehensive, efficient system of transportation. Between the 1960's and the mid 1980's Nigeria, however, experienced tremendous fluctuations in oil prices. In the 1960's they took approximately four hundred million dollars per year. By the 1970's they had annual surpluses approaching five billion dollars. It is understandable that this sudden affluence would result in spending binges. These included the rapid development of universities, research institutes, television stations, roads, reservoirs, airports and an interior capitol city. When the oil prices dropped dramatically, brakes were applied nationwide to many partly completed projects. Many others, already completed, have deteriorated due to a lack of maintenance or repairs. Nigeria's rapid entry into the information age experienced a sudden slowdown ("go-slow").

During the oil boom years enterprising young people left rural villages in large numbers to seek their fortunes in the cities. Lagos grew from 300,000 to 3 million in a decade. Richard Lamb, the former bureau chief for the Los Angeles Times, writing in the early 1980's, describes some of the problems that accompanied the mass exodus:

> "The country that was once self-sufficient in agricultural produce now imports four times more food than it did a decade ago at an annual cost of $1 billion. ...The rural exodus also strained the meager urban services to the breaking point and beyond. Nigeria had become a prisoner of its own wealth, and Lagos was a capital that tourists avoided and numerous Western diplomats refused to be posted in." (Lamb, p. 303-304).

Slums and elegant suburbs existed side by side. He estimated that in the early 1980's one percent of the population controlled seventy-five percent of Nigeria's wealth. In 1986, an estimated 80% of the people remain in rural areas and are largely illiterate (34% literacy rate estimated in 1986).

In spite of enormous economic setbacks, Nigeria remains comparatively rich in natural resources and has the potential to overcome the setbacks it has experienced due to the lower oil prices and insufficient industrial and commercial development. Imported goods and smuggling are now sharply restricted and international travel and opportunities for study abroad have diminished greatly. Every effort is made to control the use of foreign exchange.

Nigerians are tightening their belts, expecting fewer government handouts and recognizing the need to once again become self-sufficient in food production. Flour mills designed to grind imported wheat are being converted to process native maize, sorghum, millet, soya bean, plaintain, yam, potato, cassava and other local crops. By 1987, the government will no longer allow the importation of wheat. Already at three dollars a loaf, white bread has become a luxury few can afford.

Contemporary Information

Excerpts from newspaper articles of May and June, 1986 describe some of the positive ways people are coping with the current changes:

The Guardian, Thursday, November 14, 1985, p. 3
"Increased Energy Resources"
The National Union of Electricity and Gas Workers reports that electricity output in Nigeria rose by 63,052 megawatt hours this year over last year's production of 760,257 megawatt hours.

The Guardian, Thursday, May 15, 1986, p. 1, 2

"A government package for combating unemployment" was reported. It included:

- emphasis on labour intensive projects.
- a programme of integrated rural development to halt the rural-urban drift.
- the development of a population policy which would reflect the objectives and goals of the nation.

The Guardian, Thursday, May 15, 1986, p. 13

In an article entitled "Nigeria: A Future Without Oil", Boniface Chizea, a senior manager of the United Bank for Africa, recommends "diversification of the revenue base of the country in such a manner that earning would accrue from many and varied sources." There is also the need for an energy policy to reduce the current consumption pattern. Now it is constituted as follows: 75 percent comes from petroleum, 20 percent from coal, and 5 percent from gas and hydropower together. Too much energy comes from petroleum, according to the author. He calls for a halt of the subsidies of domestic prices of petroleum.

Daily Times, Thursday, May 16, 1986, p. 3

"Hope for Nigerian Agriculture"

"...Agriculture took the lion's share in the sum of recurrent and capital expenditure in the 1986 budget with a total of N896.62 million as against N408.2 million in 1985." One Naira equaled one U.S. dollar in May 1986. The author applauded the development of high yield, drought and pest resistant seeds and increased irrigation but warned against the lax policies regarding the control of profits by middlemen. He urged government support of adequate storage facilities, improved roads and inexpensive farm tools.

The Guardian, Tuesday, May 20, 1986, p. 7

"NIHORT: Increasing Fruit, Vegetable Production"

The National Horticultural Research Institute, Ibadan, reports its recent work on genetic improvements especially in traditional foods, increasing yields through improved spacing and fertilizing techniques and the development of a substitute for wheat from amaranthus, a food of the ancient Aztecs. The development of amaranthus is especially important because of its relatively high protein content (16%) and the need to reduce the amount of precious foreign exchange that Nigeria spends for wheat imports.

"Recently Nigeria exported its first batch of 300 tonnes of pineapples to Europe, thanks to NIHORT." Its researchers have been able to cut the gestation period of pineapples from 14 to 10 months and educate farmers about the multiple market potential of them. "Pineapple slices can be canned or frozen. Alcohol and organic acids can be obtained from its juice. So also can vinegar. After harvesting, the leaves can be turned into either livestock or poultry feeds." Textile materials and starch can be made from its leaves. Other uses the article mentions include: meat tenderizers, lemonade and beer chilling substances, and pudding seasonings. The author encourages the readers to think in terms of working with nature to improve their crops but yet modernizing their traditional, narrow views of farming.

The Guardian, Tuesday, June 10, 1986, p. 7
"NIOMR Builds a Solar Fish Dryer"

"...engineers at the Nigerian Institute for Oceanography and Marine Research....announced the development of a dryer which can be made largely from locally produced materials and handle up to 10 kilograms of fish at a time." It will replace the need to smoke fish, and requires no gas, coal or electricity. [It costs, however, N600.]

In the same issue, an article entitled "Increasing Fish Production" appears. The demand for fish outstrips the supply by 30 percent in Nigeria. The author points out that in six to nine months, an enterprising fish farmer can earn the equivalent of N7,000.00 if he harvests one ton of fish and sells it at N7 per kilo. This is about 100 percent profit. A long list of specific suggestions for developing a fish farm concluded the article.

These articles represent some of the more positive news items that have appeared during the last six months.

Not all of the news is so positive. Items such as the one below show a clear need for expanded, updated health information.

National Concord, Tuesday, May 20, 1986, p. 5
"Effects of Smoking Cigarettes"

CHUKWUGOZIE Eze and his wife of 10 years, Adanma, could not understand why the latter was unable to sustain a pregnancy beyond three months. The only one which lasted up to 28 weeks ended in the premature delivery of a baby boy who died. Chukwugozie could not understand why God should be so "unkind" to him and his wife.

After an indepth study of his family-tree and that of the wife's, Chukwugozie was convinced that her problem could not have been genetic. He, therefore, sent her to the US where tests confirmed that during her last pregnancy, there was premature rupturing of the membranes and accelerated aging of the placenta which brought on its sudden and premature detachment.

But that was not all. Adanma received the shock of her life when the doctor identified smoking as the primary cause of her frequent abortions.

Articles regarding health care appeared often in most of the Nigerian dailys.

Lloyd Timberlake effectively points out in his recent Earthscan book, *Africa in Crisis*, that social and political situations play major roles in the current food and energy shortages. Over or poorly distributed population, overuse or misuse of land, limited access to foreign exchange, large national debts, and inefficient use of foreign aid are a few of the reasons for Nigeria's inability to move more rapidly into the information age. Recent plans for redistributing young people in rural areas and lengthening the time college graduates must spend in the National Youth Service Corps are two positive suggestions for reversing the deterioration of the rural areas.

Unfortunately, Nigeria's population problem is still major. According to present trends, "by the time Nigeria's population reaches a 'stationary' state, it will be 618 million - far more than the population of the whole continent today." (Timberlake, p. 45)

In addition to the rapid population expansion, disease, illiteracy and poverty offset the gains Nigeria is making toward improving the living standards nationwide. Less than two percent of its GNP was provided for health care of the early 1980's and most of this was spent in the cities.

More than 80% of illness in Africa is related to impure or insufficient water supplies. There are often great shortages of it. Another shortage occurs in forest products. Most of the country's exploitable forests have already been logged. Once a major timber exporter, Nigeria may soon have to import wood for its own needs. (Timberlake, p. 106)

The revival of some traditional agricultural methods may assist Nigeria in overcoming some of the problems it faces. Timberlake points out that traditional methods in most cultures are rational and represent a culture's collective wisdom regarding the careful use of its resources. Outsiders have created many problems for people in developing countries by bringing in too much change too quickly. They have not taken local environmental conditions into account, especially in regard to soil and water. He urges people in developing countries like Nigeria to take the advice of "foreign experts" with caution and skepticism. Rather, they should study the fragile conditions of their environment and make haste slowly.

Speculations About the Future

The information age seems to be reaching Nigeria in "fits and starts." A declining economy prevents many Nigerians who have studied or worked abroad from implementing the ideas they have learned overseas. The high technology they bring home with them often cannot be maintained adequately under conditions which involve high temperatures, dust and irregular electricity.

Reforms of the educational system, the police force and the government are continuing positive indications of the energy Nigerians put forth to transform their society from one that is dependent to one that is independent and self-sufficient. College graduates are especially important in helping the country make a transition to an information age, as the "tongue-in-cheek" article below indicates.

The Guardian, Wednesday, November 6, 1985, p. 8
Letters - To a Nigerian graduate abroad

First, congratulations on obtaining the Golden Fleece. Correct me if I am wrong: B.A., Economics, B.Sc., Political Science, M.B.A. and a Ph.D. We are all proud of you. But, what is this thing about your accepting a job with the Ford

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Motor company as a junior executive with commensurate salary? You stand the danger, you know, of being considered a traitor. In every nook and corner, there are vanguard, crusaders and patriots. Where is your sense of patriotism? Why should you help Ford which is (supporting apartheid in South Africa through huge investments) when we need you here to help manage our economy.

Now, before coming home, you should be acquainted with a few facts. On arrival you will be welcomed with open arms into the NYSC, if you are under 30 years of age. However, since we do not have a salary scale (GL., USS or otherwise) equivalent to $32,500 American dollars, you will start just like everyone else on N200 a month, with N84 bicycle allowance in a single lump sum to help you in settling down. You may then be posted to any of a thousand and one hamlets scattered all over the federation, where you will probably end up teaching secondary school students the rudiments of mathematics or economics.

After one year of glorious service to the nation, the picnic starts - job hunting. Forget that IBM, Ford, Mobile and ITT sent recruiting agents to you while you were still in school and you chose the best package. Here, it's a different ball game. Austerity is the name of the game. In the 1980s, retrenchment and employment embargoes are the order of the day. Thus, though your services are urgently needed, you cannot be employed. Remember, this is Nigeria, your fatherland.

Now, assuming you secure a job in the nation's capital where all the jobs are "available", your first priority is to get accommodation. I recommend Surulere. The estate agents describe it as middle class suburb. In reality, it is a medium to high density urban nightmare. For only N3,000 you can pay one year's rent in advance. Of course, electricity and water are optional extras.

"What is the transport system like?", you may ask. Simple, there is none in Lagos.

"How is home?", you might ask? Remember, just before you left when you took me to your village and we went swimming down the creek? Well, nobody swims there anymore. Pollution (oil) has altered permanently the flora and fauna of the creeks. Even the fish no longer swim.

Please write soon and let us know, in advance, when you are arriving.

Selected Resources

Nigerian Newspapers, October, 1985 - June 1986

New Nigerian
The Guardian
Daily Times
The Statesman
National Concord
Vanguard
Nigerian Tribune
The Punch

Daily Sketch

Nigerian Magazines:

News Times, April 1986
Newswatch, May-June 1986
African Concord, May-June 1986

Books:

Lamb, David. *The African*, New York: Vintage, 1985 revised edition.

Timberlake, Lloyd. *Africa in Crisis: The Causes, the Cures of Environmental Bankruptcy*, Philadelphia, PA: New Society Publishers, in cooperation with the International Institute for Environment and Development, an Earthscan Book, 1986.

EVALUATE AND MAKE IT BETTER: AN EVALUATION OF A MALAYSIAN PARK'S CONSERVATION EDUCATION PROGRAM

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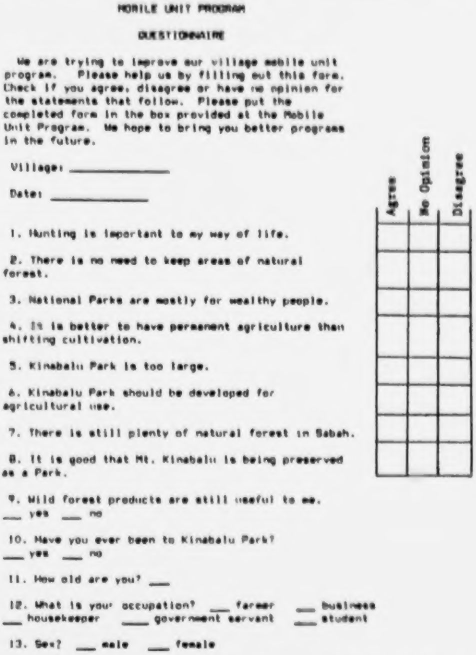
Duke University

In developing countries with limited funds available for conservation education programs, the need for evaluation to demonstrate a program's worth and to provide an opportunity for feedback and improvement is acute. This is demonstrated by an evaluation of Kinabalu Park's mobile conservation program in Malaysia. The goal of the program was to foster more favorable attitudes toward the park system and the conservation of natural resources among local villagers. The program consisted of a slide show about the park and local natural resources, a discussion period, and a wildlife film. Between 1983 and 1985, the unit visited 51 villages bordering the park, reaching an audience of about 7,000 people.

In 1985, the program was formally evaluated. A survey instrument was designed to obtain information about shifts in villagers' attitudes toward the park before and after the program. The written questionnaires consisted of seven attitude statements with responses based on a three point Likert-type scale (agree/no opinion/disagree), and six sociodemographic questions to provide background data for designing future programs (Figure 1). After pretesting, the questionnaires were distributed at 11 villages on Kinabalu Park's southern border. A total of 249 questionnaires were completed by villagers before attendance at the conservation programs, and 169 questionnaires were completed afterwards.

For analysis, the questionnaire response scores were converted to reflect an unfavorable (= 1) or favorable (= 3) attitude toward each statement. No opinion statements were scored as 2. The scores of the seven attitude statements were summed for each individual, then compared to determine any difference between mean scores before and after the program. The scores after the program were significantly greater $T_{df} = 415 = 2.61$, $p < 0.01$). Chi squared tests were used to determine if there were significant differences between before and after scores for each individual statement. Three statements elicited significantly more favorable responses after the program. The remaining four statements showed no improvement. These results provided insight into which concepts were being successfully transmitted, and which required modification.

The sociodemographic responses of the 418 villagers characterized the audience as primarily farmers who did not hunt, yet did utilize natural forest products. The majority of the respondents had visited Kinabalu Park at least once, and 73% were under 30 years of age. This information was helpful in modifying both program content and presentation (music, dialogue) to meet specific interests and needs of the audience. It also identified portions of the village population not being reached by the program. In addition to demonstrating the effectiveness of the program, and identifying needed modifications within the program, the evaluation provided a format for the park staff to request structural changes, such as a new sound system, from the administration. In an organization where a systematic review is not always conducted, this is yet another function of evaluation. In sum, evaluation can be the key to effective conservation education programs.



MOBILE UNIT PROGRAM

QUESTIONNAIRE

We are trying to improve our village mobile unit program. Please help us by filling out this form. Check if you agree, disagree or have no opinion for the statements that follow. Please put the completed form in the box provided at the Mobile Unit Program. We hope to bring you better programs in the future.

Village: ______________

Date: ______________

	Agree	No Opinion	Disagree
1. Hunting is important to my way of life.			
2. There is no need to keep areas of natural forest.			
3. National Parks are mostly for wealthy people.			
4. It is better to have permanent agriculture than shifting cultivation.			
5. Kinabalu Park is too large.			
6. Kinabalu Park should be developed for agricultural use.			
7. There is still plenty of natural forest in Sabah.			
8. It is good that Mt. Kinabalu is being preserved as a Park.			

9. Wild forest products are still useful to me.
___ yes ___ no

10. Have you ever been to Kinabalu Park?
___ yes ___ no

11. How old are you? ___

12. What is your occupation? ___ farmer ___ business
___ housekeeper ___ government servant ___ student

13. Sex? ___ male ___ female

Figure 1. English Version of the Mobile Unit Program Questionnaire (Original in Malay and Kadazan)

CONCERN FOR THE FUTURE IN TAIWAN, R.O.C.

Kathleen Wadden
Villanova, PA

Historically, developing countries have tended to address needs and problems in terms of short term economic gains. The resulting carelessness about long-term social consequences and ecological changes eventually piles up. Taiwan, R.O.C., as a case in point, is now being forced to address extensive island-wide environmental degradation. In the last few years, Taiwan's political strategy has incorporated new environmental policies and funded research and development proposals. Concern for environmental education, however, has received very little attention. Perhaps environmental education is, politically, a more sensitive area than the government cares to admit. If the goals of environmental education strive to effect social change than basic assumptions about the existing society may be questioned. As people recognize and learn that actions altering the environment inevitably influence their own well being, then they may wish to have a say in decisions regarding environmental matters. If the government does not appear to be prioritizing the welfare of the people, social and political dissension can arise, especially if the information available is suspect and incomplete. The hidden costs of development are often intentionally hidden. It is suggested here that social and political tension exists in Taiwan, in part, as a result of the country's environmental problems.

If appreciation is a matter of education and not of culture, then environmental education can operate in the service of both the society and the environment. The dramatic impact of urbanization in Taiwan, its influence on human life and lifestyle, has had an equally profound effect on the landscape. Environmental education should address the relationship of people and landscape and question how the environmental needs of both can be harmonized. Agriculture may be the root, but technology is the flower of environmental poisoning. Today in Taiwan, and almost everywhere man resides on the globe, the accomplishments of developing a civilization stand along side of the damages. An effort to reform some harmful practices and a concern about preventing further environmental degradation has surfaced in Taiwan in the wake of a growing popular environmental movement. It seems highly appropriate to include environmental education as a keystone in this reform spirit. In my grant project, funded by the Pacific Cultural Foundation, I have been examining the prospects and possibilities for establishing an environmental education center in Taipei County.

There is indeed a need in Taipie, Taiwan, for an educational center which centralizes information and provides communication and a research network. In my view, an environmental education center has as its purpose:

A. Educating the community and providing a diverse curriculum for all age levels.
B. Exploring the many aspects of the relationship between

environment and society, the positive and problematic should be given equal time.

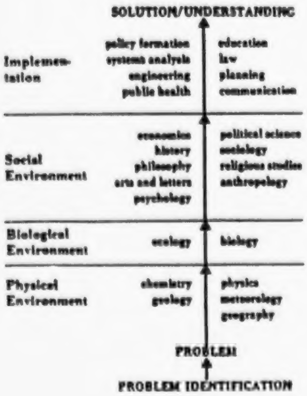
C. Encouraging environmental appreciation, awareness and community participation.
D. Teaching about conservation, preservation and environmental protection.

My work on this grant project has been focusing on actually establishing a plan to develop an environmental education center. In an attempt to confirm the status of need, my effort has focused on an examination of these factors:

1. Identifying reasons for the center and locating cooperating groups and persons.
2. Considering potential locations for a center and evaluating its range of purpose.
3. Examining prospects for resources to actually establish a center (building and funding) and staffing it.
4. Determining appropriate programming for an environmental education curriculum.

A center for environmental education, ideally, should integrate research, teaching and an educational philosophy into curriculums which support the community in its effort to raise environmental awareness and to encourage involvement. It remains questionable, however, whether environmental education, in its approach to learning, can be satisfied with discovering and communicating nature's pleasures and concerns. While always a vehicle for understanding, an environmental education center may also need to be a platform for advocacy.

As the diagram below reveals, identification of an environmental problem or phenomenon begins in the physical environment. An analysis of the circumstance must pass through a survey of its relationship to the biological environment and then the society at large. Only after full consideration of the physical biological and human factors can any sort of plan or action be recommended.


SOLUTION/UNDERSTANDING
Implementation
policy formation
systems analysis
engineering
public health
education
law
planning
communication
Social Environment
economics
history
philosophy
arts and letters
psychology
political science
sociology
religious studies
anthropology
Biological Environment
ecology
biology
Physical Environment
chemistry
geology
physics
meteorology
geography
PROBLEM
PROBLEM IDENTIFICATION

An environmental education program hopefully presents a synthesis of this process. In other words, no aspect of the problem in relation to the total environment should be left out. As a result, and as the graph clearly indicates, environmental education is an interdisciplinary process, whose ultimate goal is simply to instill appreciation of the living world which surrounds us and which we depend upon. Finally, the creation of an environmental education center develops opportunities for the community members to serve the community in the interest of the local environment. The challenge and opportunity for community involvement should branch across all age groups and backgrounds because the common interest is of concern to all.

Concern for the environment is not the domain of scientists, politicians, or planners. A society needs good writers, thinkers and teachers. As a person trained in interdisciplinary studies, I see the field of environmental education as a cooperative venture - one which places the interests of nature in alliance with humans for the common good and survival of both. This alliance is one I term a cultural or ethocentric viewpoint. The Taipei Environmental Education Center, which I have been proposing and I am designing is just one small attempt to give nature a voice.

The scope of the curriculum for this center should try to include activities which appeal to a wide age group regardless of educational background. The center's programming schedule would include as many of the following as time, budget, staff and public demand allow:

1. Workshops
2. Field trips and nature walks
3. Children's programs
4. Adult lectures and extension classes
5. Audio visual presentations
6. Library
7. Nature classes
8. Exhibits (displaying the work of local artists)
9. Newsletter (a spokespiece for the center which should include a monthly calendar of activities)
10. Public information on environmental issues, the parks and recreational facilities across the island.

While to some people it may seem trivial, it seems important that the spirit of the Taipei center be embodied in some sort of symbolic form or logo. As one example, I have chosen a butterfly sitting on a flower as a motif, mainly to appeal to children. Using a wheel-like flower shape, each programming unit is meant to be a pedal. The stem identifies the center and the butterfly sits in the middle.

This symbolic representation was suggested to me, in part, when rereading a passage written by American naturalist John Muir (1838-1914). He was speaking of his first months in California in 1867 when he wrote:

> Since coming to this Pacific land of flowers I have walked with Nature on the sheeted plains, along the

> broidered foothills of the great Sierra Nevada, and up in the piney, balsam scented forests of the cool mountains. In these walks there has been no human method - no law - no rule. A strong butterfly full of sunshine settles not long in any place. It goes by crooked unanticipated paths from flower to flower (Wolfe, 1979).

John Muir was an early preservationist, national park advocate and co-founder of the Sierra Club. The essece of Muir's writing consistently suggests the foundation of environmental education - that we must learn to walk with nature again. His message seems very appropriate to the spirit of the proposed Taipei center.

References

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ENVIRONMENTAL MANAGEMENT AND DECISION MAKING: A PROCESS TO DEVELOP AND MANAGE THE RESOURCES OF A REGION

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Western Carolina University and the Tennessee Valley Authority (TVA) have developed a course on integrated regional resources for resource practitioners in developing countries. The course is designed to demonstrate the value of integrated resource management and to provide experience in applying integrated resource management concepts to the participant's own situation. Participants are encouraged to identify personal objectives, share their home country situation, and adapt the course content to the realities they face.

This course of study on integrated regional resources management based on the experience of the Tennessee Valley Authority (TVA), has been developed for resource practitioners in developing countries with responsibility in areas, such as water resource management, agriculture, fertilizer and chemical development, forest and wildlife management, air resource management, energy production and utilization, engineering design and construction, regional economic and community development, and land use.

Integrated regional resources management is a multidisciplinary decisionmaking process in which specialists from various fields work together to develop and manage the resources of a region. The process facilitates the unified (orderly) development of a region's resources. It can take many different forms, depending on local, regional, and national circumstances. Regardless of the form, its objective is to opitimize the use of available resources in the short term while maximizing resource benefits in the long term. The goal of this course is to introduce the participant to the basic aspects and techniques of integrated regional resources management and to show the application of the techniques to a particular region.

The course objectives, as outlined by TVA and WCU, are to provide an intensive learning experience to help participants to:

- understand the principles and values of integrated regional resources management;
- develop awareness, knowledge, and skills necessary to formulate integrated resource development programs and projects;
- show through case studies how integrated approaches have a synergistic effect;
- apply integrated resource management approaches to their own work;
- meet and consult one-to-one with other resource managers, university faculty, and technical experts from TVA.

The course will be presented in the Tennessee Valley region. The location provides opportunities to show how research and technologies are used to develop the resources of a region. Instructors will include experienced coordinators, managers, and technical staff from a wide range of resource areas. Participants will also have the opportunity to interact with decisionmakers and resource specialists who have worked in partnership with the agency to develop resource programs and projects.

The course is flexible enough to meet a wide variety of instructional needs. Course material, including a text and instructor's guide, is divided into 14 instructional modules. Each module was developed by specialists within the particular subject area. In order to build a common background of understanding, the text was written for managers with expertise in other resource areas. Course modules include:
(1) Integrated Regional Resources Management... An Overview
(2) Regional Economic Development
(3) Building Organizational Capability
(4) Water Resources
(5) Agricultural Resources
(6) Fertilizer and Chemical Resources
(7) Forest Resources
(8) Wildlife Resources
(9) Air Resource
(10) Energy Resources
(11) Designing and Building for the Future
(12) Community Development
(13) Land Use
(14) Integrated Regional Resources Management Practicum

Each module contains a combination of lectures, readings, case histories, field observations, and case study activities combined with group exercises in which participants plan and evaluate integrated resource development programs and projects. The final module is a practicum where participants will have an opportunity to apply the concepts from the resource areas to a specific situation and develop an integrated resource management plan.

Modules range in length from one to five days. Each module can be expanded and offered separately to meet the needs of professionals seeking detailed knowledge and skills in a particular resource area. Even if offered separately, the modules emphasize the need for managing in an integrated context.

The purposes, histories and locations of Western Carolina University and the Tennessee Valley Authority provide rare combinations of resources appropriate to the application of integrated regional resource management. The University is located in the Tuckaseigee River basin between the Blue Ridge and the great Smoky Mountains which places it near large areas of TVA, National Park Service, U.S. Forest and private lands. The University is involved in a variety of ways in the management of these resources through teaching, research and creative public service.

The Tenessee Valley Authority has gained worldwide recognition during its 52 years of integrated resource development experience in the Tennessee River Valley. Before the agency was formed by the U.S. Congress, the Tennessee Valley was one of the Nation's poorest regions. Flooding occurred often, hillsides were badly eroded, most of the people lived on small, nonproductive farms, only 3 out of every 100 farms had electricity, and per capita personal income was about 45 percent of the national average.

Since TVA's beginning in 1933, the mission of the agency has been to plan for the proper use, conservation, and development of all the resources of the Tennessee River drainage basin and its adjoining territory for the general, social and economic welfare of the Nation.

Now the Valley attracts many industrial customers with its abundant supply of electricity; per capita income has improved to about 85 percent of the national average, and TVA has played a major role in the overall improvement of the Valley region and people. TVA's commitment to integraed resource development recognizes that (1) natural resources are interrelated, (2) what is done with one resource often affects other resources, and (3) social and economic development are inextricably linked to the wise use of those resources. Through this course TVA will share its successes and failures in integrated regional development in the Tennessee Valley and will assist participants in developing a project-specific practical workplan for an integrated development project.

A tentative course outline includes:

Introduction

- Welcome to WCU and TVA

- Course Overview

Review of Integrated Regional Resources Management (IRRM) Fundamentals

- Principles, Values, and Aspects
- Barriers to Integration
- Breaking Down the Barriers

Regional Social and Economic Development

Organizational Capability

Application of IRRM: Resources and their Interrelationships

- Water Resource
- Agricultural Resources
- Fertilizer and Chemical Resources
- Forest Resources
- Air Resources
- Energy Resources
- Designing and Building for the Future
- Community Development
- Land Use

Integrated Regional Resources Management Practicum

Reassessment: How Does This Apply to Me?

Presentation of Group Projects

The course will be conducted by TVA staff and University faculty representing a wide range of resource areas. Three semester hours of academic credit may be awarded by WCU at the participants' requests and upon successfully completing the course.

The course is scheduled for the summer of 1987.

EXPANDED CRANE RESEARCH AND EDUCATIONAL ACTIVITIES IN INDIA, PAKISTAN AND NEPAL

Steven Landfried
The Big House
Evansville, WI

This presentation describes several years of research, including the rare Siberian Crane, in India, Pakistan and Nepal. Critical to the project's success have been educational efforts sensitive to local cultural mores in the three countries to develop attitudes amenable to the cranes' survival.

ESTABLISHMENT OF A WORLD ENVIRONMENTAL EDUCATION FUND: PRINCIPLES AND PROGRAM FOR ACTION

David Burack, Louis Berger International, Inc.
Washington, D.C.

Barbara Jones
Vancouver, British Columbia

At the 1984 Lake Louise Conference, workshop participants recommended "development of a World Environmental Education Fund to support and make real the possibility of the 'new environmental ethic' called for in the Banff Declaration." An innovative and practical method for establishing such a fund - with true international support - will be represented. In addition, fair and efficient methods for administering the fund will be discussed. Illustrated.

THINKING GLOBALLY, ACTING LOCALLY: WORK, TECHNOLOGY AND CONSUMPTION IN A FINITE WORLD

David Wilson
Missouri Botanical Garden, St.Louis

This slide-talk contrasts life in the U.S. with that in China, India, and South America, and challenges audience to think about their own lives in different ways. Ways are suggested that enable teachers to empower their students by involving them in local projects where they study global themes such as acid rain, population growth and energy limits.

COMMUNICATION STRATEGIES FOR ENVIRONMENTAL PROTECTION IN DEVELOPING WORLD AREAS

Victoria Dompka
Better World Society
Washington, D.C.

A synopsis of formal and non-formal education efforts in representative countries, including Honduras, Costa Rica, Haiti, Dominican Republic, Ecuador, and Puerto Rico will be presented. This will provide a cross section of differing country profiles and how they currently treat public education of environmental issues. The presentation will also offer communication strategies which can be used as part of governmental and/or non-governmental organizations (whichever handle the environmental communications for that area). These strategies will be compiled from "tried and true" plans from international communications organizations, and from the actual country cases' successes and failures.

ENDANGERED SPECIES AND CULTURAL CHANGE IN THE WESTERN CARIBBEAN

John Cooley
Western Michigan University, Kalamazoo

This paper is a study of the last days of traditional turtle fishing culture in the Western Caribbean of the 1960's and of the rapid waves if change that have washed through the Islands of this region in the last two decades. The literary anchor for this presentation, Peter Matthiessen's celebrated novel FAR TORTUGA (1975), has received attention primarily as sea literature and in the pastoral tradition. By contrast, I will focus on the ways in which FAR TORTUGA captures Cayman and western Caribbean environmental and cultural issues and changes during the last two decades.

BUDDHA DEIFING, AND BIOLOGY: CHINA'S LIKELY ECOLOGICAL FUTURE

David Hicks
Whitworth College
Spokane, WA

Can China create a sustainable future for her billion citizens? What is the most appropriate course of development to conserve the resource base and to install a modern techenological infrastructure? Is it possible to improve the standard of living while simultaneously repairing the ravages of deforestation, soil erosion, contaminated surface waters, and declining air quality? China's developing economy must not sacrifice her hard-pressed ecology. Her huge population (80% rural, deficient transport system, limited space for urban expansion, hostile climate and topography, and technological poverty put unique restraints on both the direction and rate of development.